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LELAND·STANFORD·JVNIOR·VNIVERSITY

ANNALS

OF THE

LYCEUM OF NATURAL HISTORY.

New York academy of sciences.

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CONTENTS

OF THE

EIGHTH VOLUME.

BY PROFESSOR ALEXANDER AGASSIZ.

PAGE

NOTES on the EMBRYOLOGY OF STARFISHES (TORNARIA) 240

ON the Young Stages of a few ANNELIDS 308

BY S. C. H. BAILEY.

ON the MINERALOGY of New York Island 185

BY THOMAS BLAND.

ON the Family PROSERPINACEA, with a description of a New Species of the Genus PROSERPINA 14

REMARKS on Classifications of North American HELICES by European Authors, and especially by H. and A. ADAMS and ALBERS 17

NOTE on certain INSECT LARVA-SACS, described as Species of Valvatae . 144

NOTES on certain TERRESTRIAL MOLLUSCA, with descriptions of NEW SPECIES 155

BY PROFESSOR THEODORE GILL.

NOTE on the Family of MYLIOBATOIDS, and on a New Species of AETOBATIS . 135

ON a Remarkable New Type of Fishes allied to NEMOPHIS 138

ON a New Family Type of Fishes related to the BLENNIOIDS 141

EXPLANATION of Plate III. 300

BY AUGUSTUS R. GROTE.

REMARKS on the SPHINGIDAE of Cuba, and description of a New Species of AMBULYX from Brazil 195

BY AUGUSTUS R. GROTE AND COLEMAN T. ROBINSON.

LEPIDOPTEROLOGICAL Contributions 351

NOTES on the Lepidoptera of America, No. 1. 432

BY THE HON. RICHARD HILL.

NOTES on the Natural History of the SCORPION 387

ADDITIONAL Note on the Natural History of the SCORPION 486

BY PROFESSOR C. H. HITCHCOCK.

ESCRIPTION of a New REPTILIAN BIRD from the Trias of MASSACHUSETTS . 301

PAGE.

BY DR. J. W. HUBBARD AND SANDERSON SMITH.

Catalogue of the Mollusca of Staten Island, N. Y. 151

BY PROFESSOR CHAS. A. JOY.

Examination of a few American Minerals 120
Examination of American Blendes for Thallium and Indium . . . 247

BY ALEXIS A. JULIEN.

On the Geology of the Key of Sombrero 251

BY HENRY KREBS.

Remarks on some Species of West Indian Marine Shells in the Cabinet of Amherst College, Mass. 394
Catalogue of Marine Mollusks, collected in the Bahama Islands in November, 1866 427

BY GEORGE N. LAWRENCE.

Catalogue of a Collection of Birds, made in New Granada, by James Mc Leannan, Esq., of New York, with Notes and Descriptions of New Species. Part IV. 1
Descriptions of New Species of Birds of the Families Tanagridae, Cuculidae, and Trochilidae, with a Note on Panterpe insignis . . . 41
Catalogue of Birds collected at the Island of Sombrero, W. I., with observations by A. A. Julien 92
Descriptions of New Species of Birds of the Families Tanagridae, Dendrocolaptidae, Formicaridae, Tyrannidae, and Trochilidae . . 126
List of Birds from near David, Chiriqui, New Granada, collected for the Smithsonian Institution by Mr. Fred. Hicks, with descriptions of

PAGE

SUMMARY of the Meteorological Register for 1865, kept in the City of New York 238

BY EDWARD S. MORSE.

DESCRIPTIONS of New Species of PUPADAE 207

BY TEMPLE PRIME.

NOTES on Species of the Family CORBICULADAE, with Figures . 57, 213, 414
DESCRIPTION of a New Species of Mollusca, of the Genus GLAUCONOME . 107
NOTES on the Classification of the Corbiculadae, etc. 418

BY SANDERSON SMITH.

NOTICE of a Post-Pliocene deposit on Gardner's Island, Suffolk County, N. Y. 149
CATALOGUE of the Mollusca of Little Gull Island, Suffolk County, N. Y. . 194

BY R. P. STEVENS, M.D.

REPORT upon the Past and Present History of the Geology of New York Island 108

BY THEO. A. TELLKAMPF, M.D.

ON the Classification of the APHREDODERUS GIBBOSUS Le Sueur; SCOLOPSIS SAJANUS J. Gilliams 399

BY PROFESSOR JOHN TORREY.

ON AMMOBROMA, a New Genus of Plants, allied to Corallophyllum and Pholisma 50

LIST OF PLATES, VOL. VIII.

Plate 1.—Ammobroma Sonoræ, Torrey.
For explanations see page 56.
Plate 2.—Tornaria,
For explanations see page 246.
Plate 3.—Fig. 1. Plagiotremus spilistius, Gill.
2. Head of the same from below.
3. Chœnopsis ocellatus, Poey.
For explanations see page 300.
Plate 4.—Key of Sombrero, W. I.
Fig. 1. Geological map of the Key, the beds lettered upwards from A to F.
2. Section of the same.
Plate 5.—Key of Sombrero, illustrating the elevation and subsidence of the same.
Plate 6.
Plate 7.
Plate 8. The young stages of a few Annelids.
Plate 9.
Plate 10.

4. ♂ Endropia vinosaria, G. & R.
5. ♂ Endropia vinulentaria, G. & R.
6. ♂ Endropia textrinaria, G. & R.
7. ♂ Endropia arefactaria, G. & R.
8. ♂ Ellopia bibularia, G. & R.
9. ♀ Ellopia pellucidaria, G. & R.
10. ♀ Ellopia endropiaria, G. & R.
Plate 16.—Fig. 11. ♀ Ennomos coloradaria, G. & R.
12. ♂ Eupithecia anguilineata, G. & R.
13. ♀ Cidaria cumatilis, G. & R.
14. ♂ Cidaria atricolorata, G. & R.
15. ♂ Melanchroia regnatrix, G. & R.
16. ♂ Pantographa limata, G. & R.
17. ♀ Pantographa limata, G. & R.
18. ♂ Haemorrhagia buffaloensis, G. & R.
19. ♀ Haemorrhagia buffaloensis, G. & R.
20. ♂ Haemorrhagia floridensis, G. & R.

ANNALS

OF THE

LYCEUM OF NATURAL HISTORY.

I.—*Catalogue of a Collection of Birds, made in New Granada, by James McLeannan, Esq., of New York, with Notes and Descriptions of New Species.* Part IV.

By Geo. N. Lawrence.

Read April 27th, 1868.

(Continued from Vol. VII., page 479.)

In this Part of the Catalogue I include some additional species received from Mr. McLeannan since the publication of Part III., and also a few satisfactorily determined from a list furnished by him, without specimens—such for instance as the King Vulture, Musk Duck, Mallard, Brown Pelican, etc. I omit many others named in the list, as they require to be more positively identified. The list shows, however, that all the species inhabiting the locality (already shown to be remarkably numerous considering the restricted range in which Mr. McLeannan's collections were made), are not at present embraced in my Catalogue.

Having again thoroughly revised the species included in the preceding Parts of this paper, I now publish corrections of ascertained errors, and also descriptions of such of the species, hitherto thought doubtful, as, after further study, I believe to be new.

To Dr. P. L. Sclater, of London, I am under great obligations for valuable assistance, always most kindly and willingly afforded.

FAM. VULTURIDÆ.

SUBFAM. SARCORAMPHINÆ.

361. *Sarcoramphus papa* (*Linn.*).
362. *Cathartes aura* (*Linn.*).
363. " *atratus* (*Bartram*).

FAM. FALCONIDÆ.

SUBFAM. AQUILINÆ.

364. *Pandion Carolinensis* (*Gm.*).

FAM. HIRUNDINIDÆ.

SUBFAM. HIRUNDININÆ.

365. **Petrochelidon albilinea,** sp. nov.
" *leucoptera, Lawr. nec Gm.*
No. 156 of Part II.

366. *Cotyle uropygialis, Lawr.* Ibis. Vol. V., p. 181.
" *flavigastra, Lawr. nec Vieill.* No. 157 of Part II.

FAM. TROGONIDÆ.

SUBFAM. TROGONINÆ.

367. *Trogon tenellus, Cab.* Journ. f. Orn. 1862, p. 173.
" *aurantiiventris, Lawr. nec Gould.* No. 20 of Part I.

The specimen in Part I. referred to *aurantiiventris*, was in poor condition, only a single tail feather remaining; having since received good examples of both sexes, also a young male, I think it will establish *tenellus*, above referred to, as a good species. The young male agrees almost precisely with the description given by Mr. Cabanis (the only plumage in which it is described), even to the white mark on the hind part of the eyelid; this last character is in the adult female, but in three adult male specimens it is not apparent.

This species certainly much resembles *T. atricollis*, with which Mr. Cabanis makes comparison, but the plumage of the male is more golden above and the rump and upper tail coverts dark green; the most marked difference is in the color of the tail, which is light green in *atricollis*, but in this of a dark bluish green, in some lights decidedly blue; the breast is bright orange yellow, pale in the young bird as stated by Mr. Cabanis; the other markings are similar to those of *atricollis*.

Length 9¼ in.; wing 4¼; tail 5½.

The brown color of the female is dull olivaceous not rufous, and the two central tail feathers and the outer webs of the two next on each side are deep cinnamon or chestnut brown, the inner webs of the latter being black, the three outer feathers are barred black and white, largely white at the ends. Mr. Cabanis calls particular attention to Mr. Gould's description of the female *atricollis*, as having the six middle tail feathers brown. I think this will be found not to be strictly so, but to apply to the two central entirely and the outer webs only of the two next; this is the case with the female of *atricollis* in the Museum of the Phil. Acad., the inner webs of the two feathers next the central being black.

FAM. BUCCONIDÆ.

SUBFAM. BUCCONINÆ.

368. *Malacoptila inornata* (*Du Bus*).

FAM. TROCHILIDÆ.

SUBFAM. TROCHILINÆ.

369. *Heliomaster Sclateri*, *Cab.*

FAM. DENDROCOLAPTINÆ.

SUBFAM. SCLEURINÆ.

FAM. TROGLODYTIDÆ.

SUBFAM. TROGLODYTINÆ.

373. **Cyphorinus Lawrencii,** sp. nov.
" " *Scl.* M.S.
" *cantans*, *Lawr. nec Gm.* No. 50 of Part I.

In the Annals of the Lyceum, Vol. VII., p. 293, I gave a description of this species and referred it to *C. cantans*, Gm. I was led into this error by specimens so labelled in the Museum of the Phil. Acad. On discovering that it was not that species, I sent specimens to Mr. Sclater, who decided that it was undescribed, and complimented me by conferring my name upon it.

The measurements given in the description above referred to are those of the female; the male measures, length 5½ in.; wing 2¾; tail 1⅝; bill ⅞; tarsi 1.

I have one female specimen which has the chin and centre of the throat pure white, the chesnut color extending around it in a broad margin; this is probably an accidental variation.

374. *Thryothorus rufalbus*, *Lafr.*
" *longirostris Lawr. nec Vieill.* No. 190 of Part II.

This species, in the Museum of the Phil. Acad., is labelled *T. striolatus*, which is a synonym of *T. longirostris*; finding on a new examination that this was not correctly named, I referred it to Mr. Sclater, who determined it to be *T. rufalbus*.

375. *Thryothorus modestus*, *Cab.* Jour. f. Orn. 1860, p. 409.
" *leucotis*, *Lawr. nec Lafr.* No. 191 of Part II.

Mr. Sclater decides that this is the closely allied species of Mr. Cabanis referred to above.

FAM. MNIOTILTIDÆ.

SUBFAM. MNIOTILTINÆ.

376. *Dendrœca coronata* (*Linn.*).
377. *Myiodioctes mitratus* (*Gm.*).

FAM. VIREONIDÆ.

SUBFAM. VIREONINÆ.

378. *Vireosylvia Bogotensis*, *Bryant ?*

This resembles *V. olivacea*, but is, I think, distinct; it may be Dr. Bryant's species described Proc. Bost. Soc. N. H. Vol. VII., p. 227, to which I refer it provisionally.

FAM. FORMICARIDÆ.

SUBFAM. FORMICIVORINÆ.

379. *Formicivora virgata*, *Lawr.* Ibis, Vol. V. p. 182.
380. " *melæna*, *Sclater.* ♂
381. *Ramphocœnus rufiventris* (*Bp.*).

This resembles *P. leucaspis*, but in that species the upper plumage is of a brighter color, more red, especially on the head, this color extending to the bill. I pointed out these differences in Vol. VII. p. 326, and have now determined that they will bear separation.

283. *Myrmelastes corvinus*, *Lawr.* Ibis, Vol. V. p. 182.

FAM. TURDIDÆ.

SUBFAM. TURDINÆ.

384. *Turdus minimus*, *Lafr.* ?

The *T. minimus*, Lafr. is considered by some writers as of doubtful validity, and has been referred to *T. Swainsoni*, Cab. Dr. Bryant, however (Proc. Bost. Soc. N. H.), considers it entitled to specific rank, based upon a specimen in his cabinet from Bogota. This bird is of the same dimensions as those of *T. minimus*, but apparently somewhat different in colors.

My specimen is certainly very distinct from *Swainsoni*, and in measurements agrees with those of Lafresnaye and Dr. Bryant, but in coloration it does not agree satisfactorily with either.

Awaiting further light, and a comparison with Dr. Bryant's specimen, I have placed it for the present as *T. minimus*.

An examination of the type, by some competent judge, will probably be necessary to properly establish the position of Lafresnaye's bird.

FAM. TYRANNIDÆ.

SUBFAM. ATTILINÆ.

385. *Attila citreopygius* (*Bon.*).

SUBFAM. PLATYRHYNCHINÆ.

386. *Platyrhynchus superciliaris*, *Lawr.* Ibis, Vol. V. p. 184.

" *cancroma*, *Lawr. nec Licht.* No. 250 of Part II.

A second examination showed this to be quite distinct from "*cancroma*" and undescribed.

Subfam. ELAINEINÆ.

387. *Myiozetetes marginatus, Lawr.* Ibis, Vol. V. p. 182.

388. **Rhynchocyclus flavo-olivaceus,** sp. nov.

Male. Third quill slightly longest, second, fourth, and fifth equal, first shorter than sixth. Upper plumage of a bright yellowish olive green, scarcely duller on the crown; tail olive brown with yellowish green margins; quills umber brown, the primaries edged with yellowish green, the secondaries with pale yellow; the smaller wing coverts are the same color as the back, the larger are brown, both broadly margined with light yellow; entire under plumage pale yellow, brightest on the middle of the abdomen, on the chin slightly greyish; under wing coverts pale yellow; upper mandible black, the lower pale yellowish white; the tarsi appear to have been of a yellowish flesh color, toes and claws brown.

Length 5 in.; wing $2\frac{3}{8}$; tail $2\frac{3}{8}$; tarsi $\frac{11}{16}$.

Allied to "*sulphurescens*" and "*cinereiceps,*" but differs in

FAM. COTINGIDÆ.

SUBFAM. LIPAUGINÆ.

393. **Lipaugus albogriseus**, sp. nov.

Front and crown black; sides of the head plumbeous black; hind neck, back, and smaller wing-coverts of a rather dark ashy bluish grey, on the middle of the back slightly tinged with yellow; rump white; upper tail coverts like the back; tail black, the outer edge of the lateral feather and the tips of all the others narrowly margined with white; wings, and middle and greater wing coverts black, the secondaries narrowly edged with white, the tertiaries and wing coverts broadly and conspicuously margined with white, the primaries wholly black; throat, breast, and sides of a clear bluish ashy grey, lower part of breast, abdomen, and under tail coverts pure white; under wing coverts and inner margins of quill feathers white; bill brownish black, base of under mandible lighter brown; tarsi and toes black.

Third quill longest, fourth nearly as long, second a little shorter than the fourth, first intermediate between the sixth and seventh.

Length 7 in.; wing $3\frac{3}{4}$; tail $3\frac{3}{8}$; bill $\frac{5}{8}$; tarsi $\frac{11}{16}$.

It is with some hesitation that I have placed the above described bird in Lipaugus, but its affinities seem nearer to this genus than to any other.

FAM. TANAGRIDÆ.

SUBFAM. TANAGRINÆ.

394. *Phœnicothraupis fuscicauda*, *Cab.* Jour. f. Orn. 1861, p. 86.

This differs from *P. rubicoides* (also found on the Isthmus), in having a well defined scarlet patch on the throat, the general color is of a deep vinous or purplish red, the wings and tail more brown and the bill rather larger; *rubicoides* is more uniformly red, and the prevailing color is much lighter.

I have a specimen from St. Martha, which is of a still browner color than those from Panama, but this is attributable probably to its being younger. Mr. Sclater in his Catalogue of American

Birds, p. 83, gives *P. erythrolæma* from this point; his specimen was received from Verreaux with Bonaparte as authority for the name, to which Mr. Sclater says he can find no reference. My specimens from the Isthmus and St. Martha I consider the same, and think it probable that the names of both Bonaparte and Cabanis refer to this species; if so, and Bonaparte's name was not published prior to the date of Mr. Sclater's catalogue, *fuscicauda* will have priority.

The female of this species is darker in color than that of *rubicoides*, the plumage both above and below having a greenish olive shade.

FAM. FRINGILLIDÆ.

SUBFAM. SPERMOPHILINÆ.

395. **Spermophila semicollaris,** sp. nov.
" *aurita, Lawr. nec Bp.* No. 276 of Part II.

Male. Upper plumage black, on each side of the neck a distinct lunate mark of pure white; tail black; quills brownish black, the middle primaries marked at the base with a white spot which is partly concealed it differed from *S. cinerea*, in Part III., and proposed the name now adopted should it prove to be different. Having satisfied myself that they are specifically distinct, I consider it entitled to the above name.

FAM. PSITTACIDÆ.

SUBFAM. ARAINÆ.

397. *Ara aracanga* (*Linn.*), ♂ & ♀

398. *Conurus chrysogenys*, *Mass. et Souanc.*
pertinax, *Lawr. nec Linn.* No. 277 of Part II.

I placed this species as *pertinax* with a doubt, and pointing out wherein they differed; a second examination satisfied me that they were not the same, and being unable to determine it satisfactorily I sent it to Mr. Sclater, who identified it as above.

SUBFAM. PSITTICINÆ.

399. *Psittacus pulverulentus*, *Gm.*

FAM. PICIDÆ.

SUBFAM. PICINÆ.

400. *Celeus squamatus*, *Lawr.* Ibis, Vol. V. p. 184.

FAM. CUCULIDÆ.

SUBFAM. CROTOPHAGINÆ.

401. *Crotophaga sulcirostris*, *Sw.* ♂ & ♀

FAM. COLUMBIDÆ.

SUBFAM. TURTURINÆ.

402. *Streptopelia risoria* (*Linn.*).

This species appears to have established itself on the Isthmus in a wild state and found congenial quarters for its increase. Mr. McLeannan writes me that he had heard it "at two extreme points on the Isthmus, ten miles from the Atlantic and six from any habitation, and also four miles from the Pacific close to a village, and have been told by a gentleman surveying here, who knows the bird well, that he saw them on a stream called the Cabiancho, a tributary of the Gatun."

It is probable that its colonization originated from a pair that had been domesticated.

The specimen sent is in fine plumage, with no apparent evidence of its having been in confinement. The colors seem precisely as in the domestic bird, but in the single specimen sent there is a bare space around each eye, which may be accidental, but is worthy of being noted.

FAM. CRACIDÆ.

SUBFAM. PENELOPINÆ.

403. *Penelope purpurascens*, *Wagl.*

SUBFAM. CRACINÆ.

404. *Crax globicera*, *Linn.* ♂

FAM. ANATIDÆ.

SUBFAM. ANATINÆ.

411. *Dendrocygna autumnalis* (*Linn.*).
412. *Anas boschas*, *Linn.*
413. *Dafila acuta* (*Linn.*).
414. *Cairina moschata* (*Linn.*).

FAM. PELECANIDÆ.

SUBFAM. PELECANINÆ.

415. *Pelecanus fuscus*, *Linn.*

II. *On the Family* PROSERPINACEA, *with Description of a New Species of the Genus* PROSERPINA.

BY THOMAS BLAND.

Read April 27, 1868.

THE most recent writer on the family Proserpinacea is Dr. Gray, who, in his "Guide to the Systematic Distribution of Mollusca in the British Museum," Part I. p. 188, 1857, thus describes its characters.

ORDER SCUTIBRANCHIATA.

SUB-ORDER PSEUDOBRANCHIA.

Gills in form of branched vessels on the inner surface of the mantle. Body and shell spiral. The lateral central teeth large, irregular. Operculum none. Terrestrial.

These differ from *Pulmonata* in the mantle being free from the nape, leaving the pulmonary cavity open, and in the animal being unisexual. They differ from *Phaneropneumona*, with which they have hitherto been united, in the teeth being truly *Riphidoglossal.*[*]

[*] "Teeth transparent, glass-like, in numerous longitudinal series; the central 5.1.5, variable in form; lateral very numerous, more slender, curved at the tip."—GRAY, l. c.

FAMILY PROSERPINADÆ.

Muzzle short, annulated. Tentacles lateral, subulate, short, distant. Eyes sessile on the outer side of the base of the tentacles; sides simple, without any membranaceous fringe or lateral beards. The lateral central teeth large, irregular, lobed or dentated. Foot moderate, truncated in front, acute and keeled above behind, with a concavity in the front part for the base of the shell, lined with an extension of the mantle. Operculum none. Shell spiral, depressed; whorls close-pressed, more or less covered with a polished coat; aperture lunate, with a fold forming a slight truncate canal at the columnar angle. Peristome simple, acute; throat and inner lip with spiral laminæ; axis covered with a callous deposit; the septa between the upper whorls absorbed."*

In the Family under consideration there are two Genera, which, with the species hitherto known, are thus characterized by Pfeiffer (Mon. Auric. Viv., pp. 168–174, 1856).

I. CERES GRAY.

T. helicinæformis, carinata, superne rugosa, epidermide tenui obducta, basi callo nitido munita; apertura in speciebus notis utrinque lamellifera;

II. PROSERPINA GRAY.

T. imperforata, helicinæformis, subglobosa vel depressa, lævigata, utrinque callo nitido obducta; columella unidentata; paries aperturalis lamina 1 vel pluribus spiralibus munitus; apertura lunaris, sæpe laminis palatalibus coarctata; perist. simplex, rectum.

Pfeiffer divides this species into the two following sections:—

A. Lamellis palatalibus instructæ, (*Genuinæ*) § I., Nr. 1–2.

B. Lamellis palatalibus carentes, (*Odontostoma Orb.*) § II., Nr. 3–6.

§ I.

1. P. nitida Gray.

— apertura "lamellis 4–5 coarctata: 1 maxima in ventre anf. penultimi (interdum superposita secunda, minore, profundiore, illiparallela), 1 horizontali, subtorta, valida ad columellam, 2 parallelis in basi anfractus ultimi."*

Hab.—Jamaica.

2. P. linguifera Jonas.

β. minor. *P. pulchra C. B. Adams.*

— apertura "5 plicata: plicis 2 inæqualibus in ventre anfr. penultimi, 2 parallelis in margine basali, quinta valida, transverse prominente ad columellam."

Hab.—Jamaica.

§ II.

3. P. pisum C. B. Adams.

— apertura bidentata: "dente 1 transverso ad columellam subverticalem, altero approximato ad parietem aperturalem."

Hab.—Jamaica.

---

* Pfeiffer gives the following measurements of this species—Diam. maj. 9, min. 8, alt. 4 mill. I have a specimen, Diam. maj. 11, min. 10, alt. 5 mill. The presence of the second parietal tooth is the rule rather than the exception.

4. P. globulosa Orbigny.

— apertura bidentata: "dentibus approximatis, altero lamellæformi, intrante in pariete aperturali, altero acuto in columella."

Hab.—Isle of Pines; also Cuba.

5. P. depressa Orbigny.

— apertura bidentata: "dentibus approximatis, altero lamellæformi, intrante in pariete aperturali, altero acuto in columella."

Hab.—Cuba.

6. P. bidentata C. B. Adams.

— "apertura dentibus 2 instructa, altero prope basin columellæ, altero paulò supra eum."

Hab.—Jamaica.

It will be noticed that the existence of one or more parietal or palatal teeth, in addition to the fold or tooth on the columella, is given as a characteristic of the Family.

The recent discovery, however, of the species described in

Shell depressed, thin, highly polished, diaphanous, reddish-yellow; spire little elevated; suture distinctly impressed; whorls 5, slowly increasing, the last broad, rather convex at the base, excavated near the columella; aperture lunate, with an acute tooth-like fold on the columella; perist. simple, thin.

Diam. maj. 10, min. 9, alt. 4 mill.

Habitat.—The mountains between Porto Cabello and Valencia, Venezuela. Rob't Swift!

Remarks.—This shell is most nearly allied in form to *P. depressa Orb.*, but has less basal callus even than that species, and is readily distinguished from it, especially in being without the parietal lamella. In *P. Swifti* the delicate thinness of the shell, the impressed suture, and absence on the surface generally of the callous thickening which prevails more or less in the other species of the genus are marked characters.

P. Swifti is the sole representative of the Family at present known to inhabit South America. Ceres belongs to Mexico, on the borders of the Gulf. Proserpina had hitherto been found only in Cuba, the Isle of Pines, and Jamaica.

I dedicate the species to my friend Mr. Robert Swift, who called my attention to it, and gave me specimens when I was with him in St. Thomas, W. I., in November, 1862.

III.—*Remarks on Classifications of North American* HELICES *by European Authors, and especially by* H. & A. ADAMS *and* ALBERS.

BY THOMAS BLAND.

Read October 12th, 1868.

No classification or arrangement of Terrestrial Mollusks, embracing the numerous Genera and Sub-genera proposed by European authors, has at present been attempted or discussed by American Conchologists.

In this paper I propose to give particulars of, and observations especially upon the classifications* by H. & A. Adams, (*Genera of Recent Mollusca*, II., *London*, 1855), and by Albers, (*Die Heliceen*, *Leipsic*, 1860, *2d Ed.*, *by Von Martens*), of the species of Helix which inhabit North America, exclusive of the Pacific Coast and Mexico.

The following extracts from the lists of species given in the former work will show the views of H. & A. Adams; the corrections printed in Italic letters, are added by myself.

FAM. HELICIDÆ.

SUBFAM. HELICINÆ.

GEN. **Helix** L.

Subgen. POLYMITA Beck.

varians Menke.

GEN. **Macrocyclis** Beck.

Subgen. VALLONIA Risso.

annulata Case

costata Müll.

Hopetonense Shuttl.
labyrinthicum Lea
is labyrinthicum Say.
Lecontii Lea
is loricatum Gould.
loricatum Gould.
major Binn.
is var. of albolabris Say.
monodon M. & R.
obstrictum Say.
oppilatum Mor.
palliatum Say.
pustulatum Fer.
is pustula Fer.
Roemeri Pfr.
Rugeli Shuttl.
Sayi Binn.
spinosum Lea.
Texasianum Moric.
tridentatum Say.
Troostianum Lea.
uvuliferum Shuttl.
ventrosulum Pfr.
volvoxis Parr
is var. of septemvolva Say ?
vultuosum Gould.

Subgen. MESODON Raf.

albolabrum Say.
appressum Say.
elevatum Say.
Michelianum Lea
is Mitchelianum Lea.
multilineatum Say.
Pennsylvanicum Green.
thyroides Say.
zaleta Say
is exoleta Binn.

Subgen. POLYGYRA[*] Say.

fastigiatum Say
is fastigans L. W. Say.
profundum Say.
septemvolva Say.

GEN. **Iberus** Mont.

Subgen. CAMPYLAEA Beck.

electrinus Gould
is viridula Menk.
Syn. pura Alder.
sportella Gould
is var. of Vancouverensis Lea.
strigosus Gould.

Subgen. ARIANTA Leach.

Townsendianus Lea.

GEN. **Hygromia** Risso.[†]

Berlanderiana Moric.
griseola Pfr.
hispida L.
planorboides Raf.
is concava Say.
rufescens Penn.

---

[*] "Shell discoidal, more or less carinated on the upper edge of the whorls, umbilicated; aperture longer than broad; lips thickened, toothed or folded and continued, folds concave beneath; pillar-lip raised above the preceding whorl and concave beneath."—*Say Jour. Acad.* I. 276. 1818. *W. G. Binney's Ed.* p. 10.

[†] In the Synonymy of Hygromia is Fruticicola *Held.—Gen. of Recent Moll. l. c.* 214.

FAM. STENOPIDÆ.

SUBFAM. HELICELLINÆ.*

GEN. **Sagda** Beck.

Subgen. GASTRODONTA Albers.

gularis Say.
interna Say.
lasmodon Phill.
lineata Say.

macilenta Shuttl.
is lasmodon Phill.
multidentata Gould
is multidentata Binn.

GEN. **Zonites** Montfort.

fuliginosa Griff.

Subgen. CONULUS Fitzinger.

egena Say.
fulva Drap.
Syn. chersina Say.

Gundlachi Pfr.
ligera Say.
stenotrema Fer.

GEN. **Discus**† Fitzinger.

alternatus Say.
mordax Shuttl.

planorboides Raf.
is concava Say.

pura Alder.
Syn. electrina Gould.

unidentata Say
is indentata Say.
vortex Pfr.

In the above lists incongruous forms both of shell and animal are placed together, allied forms are separated, and in several cases the names of species are repeated in different genera or sub-genera, and even in different families.

Among other characteristics of the Fam. Helicidæ, H. & A. Adams give:—"foot elongated, with the hind part simple and pointed behind, not glandiferous" (II. 126); and of the Fam. Stenopidæ: "foot long and narrow, abruptly truncated behind, and furnished with a distinct, mucous, caudal gland" (II. 221); yet I find in the lists above quoted the following inconsistencies:—

FAM. HELICIDÆ.	FAM. STENOPIDÆ.
Anchistoma hirsutum Say.	Zonites stenotrema Fer.
Iberus electrinus Gould.	Helicella pura Alder.
" sportella Gould.	Discus Vancouverensis Lea.
Hygromia planorboides Raf.	" planorboides Raf.

Looking at the lists of species in the different genera and sub-genera, I notice:—

Anchistoma cereolus Muhlf. " volvoxis Parr.	Polygyra septemvolva Say.
" major Binn.	Mesodon albolabris Say.
" palliatum Say.	" appressum Say.
" Troostianum Lea.	Polygyra fastigiatum Say.
Zonites fuliginosa Griff.	Helicella fuliginosa Griff.

The arrangement of the North American Helices by Albers (*Die Heliceen, 2d ed.*) is certainly far more reliable and consistent than that of H. & A. Adams. It is based on a better knowledge of their forms and of the characters of the animals. The lists* given by the former are not simply alphabetical, as are those of the latter, but the affinities of the species are considered, their habitats stated, and geographical distribution is largely taken into account.

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* It will be understood that I extract from the lists given in both the works referred to the names only (with few exceptions) of the species which occur in North America exclusive of the Pacific Coast and Mexico.

The following extracts (to which I also add corrections, printed in Italic letters) are from the above mentioned work of Albers.

HELICEA.

B. Vitrinea.

Gen. XI. **Hyalina** (Fér.) Gray.

1. Hyalina s. str.

Type. H. cellaria Müll.

cellaria Müll.
viridula Menke.
  Syn. pura Alder.
  " *electrina Gould.*

indentata Say.
arborea Say.
Ottonis Pfr.
  is arborea Say?
limatula Ward.

2. Mesomphix Raf.

Type. H. olivetorum Hermann.

7. GASTRODONTA Albers.

Type. H. interna Say.

bicostata Pfr.
  is gularis Say.
interna Say.
gularis Say.
suppressa Say.
macilenta Shuttl.
  is lasmodon Phill.
labyrinthica Say.
lineata Say.
multidentata Gould
  is multidentata Binn.
lasmodon Phill.

GEN. XII. **Macrocyclis** Beck.

Type. M. laxata Fer.

vellicata Forbes
  is Vancouverensis Lea.
Vancouverensis Lea.
concava Say.
  (planorboides Raf.)

C. Helicacea.

GEN. XV. **Helix** Linn.

2. MICROPHYSA Albers.

Type. H. Boothiana Pfr.

minuscula Binn.
vortex Pfr.
incrustata Poey.

5. PATULA Held.

Type. H. rotundata Müll.

perspectiva Say.
striatella Anthon.
exigua Stimp.
Cumberlandiana Lea.
alternata Say.
mordax Shuttl.
  is var. of Cumberlandiana Lea.
solitaria Say.
strigosa Gould.
sportella Gould
  is var. of Vancouverensis Lea.

15. POLYGYRA Say.

Type. H. auriculata Say.

cereolus Muhlf.
volvoxis Parr
  var. of septemvolva Say?
delitescens Shuttl.
Troostiana Lea.
fatigiata Say (non Binn.)
  is fastigans L. W. Say.

* microdonta Desh.
Texasiana Moric.
Ariadnæ Pfr. ?
Hindsi Pfr.
oppilata Mor.
ventrosula Pfr.
hippocrepis Pfr.
auriculata Say.
uvulifera Shuttl.
avara Say.

16. STENOTREMA Raf.

Type. H. spinosa Lea.

- hirsuta Say.
- maxillata Gould.
- stenotrema Fér.
- Edgariana Lea.
- spinosa Lea.
- monodon Rack.
- germana Gould.
- pustula Fér.
- leporina Gould.
- Lecontii Lea
  - *is loricata Gould.*
- barbigera Redf.

17. TRIODOPSIS Raf.

Type. H. palliata Say.

- Rugeli Shuttl.
- inflexa Say
  - *is inflecta Say.*
- loricata Gould.
- clausa Say.
- vultuosa Gould.
- hopetonensis Shuttl.
- fallax Say.
- tridentata Say.
- palliata Say.
  - var. obstricta Say.
- appressa Say.
- divesta Gould.
- elevata Say.

21. Vallonia Risso.

pulchella Müll.
- *a.* costata.
- *b.* pulchella.

23. Fruticicola Held.

Type. H. hispida L.

rufescens Penn.	hispida L.

37. Arionta Leach.

Type. H. arbustorum L.

Townsendiana Lea.

52. Polymita Beck.

Type. H. muscarum Lea.

varians Menke.	submeris Migh. *is varians Menke.*

Looking at the lists of Albers, I do not understand why *H. caduca Pfr.* should not be in the same genus with *fuliginosa*, etc. *H. labyrinthica Say*, with reflected lip, is in Gastrodonta (sub-gen. of Hyalina), but the characteristic peristome both of genus and sub-genus, as described, is of the one "tenue, acutum, rectum," and of the other, "simplex, acutum." Pfeiffer (*Malak. Blatt.*) has this species in Mesodon. *H. sportella Gould*, in my opinion, var. of *Vancouverensis Lea* (*Annals* VII. 366), is in Patula (sub-gen. of Helix), while Lea's species is in Macrocyclis. *H. clausa Say* and *divesta Gould* are in Triodopsis, of which *palliata Say* is the type, but they have no teeth, and must have been misunderstood; they seem to belong rather to Mesodon.

H. obstricta is considered a var. of *palliata*, *albolabris* of *exoleta*, and *Roemeri* of *dentifera;* in the opinion of American Conchologists all are distinct species.

H. Ingallsiana Shuttl. (Mesodon), misspelt in the list quoted *Jugallsiana*, was so named in compliment to Dr. T. R. Ingalls of Greenwich, N. Y., but not described by Shuttleworth, who several years ago called my attention to it. He sent me a plate (executed under his direction), in which it is figured with *H. clausa*, *Mitchelliana*, *Pennsylvanica*, and *Columbiana*. It appears in form more like, but smaller, than *Pennsylvanica*, having a somewhat similarly shaped aperture, without, however, the callosity on the lower margin of the lip; the umbilicus partially open. I have seen no specimen agreeing with the figures.

After arranging a series of typical specimens from my Cabinet in accordance with the classification of Albers, I prepared and annex a copy of a Catalogue of all the species which inhabit North America (exclusive of the Pacific Coast and Mexico); the order in which they are given is based on that of Albers, but with changes in agreement with, and so as further to illustrate the views herein expressed.

Comparing my Catalogue with the lists of Albers, it will be noticed that I place together at the commencement, *H. fuliginosa* and the allied species. I do so because several at least of the animals of those species are known to have the mucous

W. G. Binney and myself are enabled, from personal observation, to corroborate the statement of Dr. Binney as to the existence of the mucous pore in *fuliginosa* and *laevigata*, and have noticed it also in *kopnodes*. Looking at the forms of the shells, I assume its presence in *friabilis* and *caduca*, and suspect that it will be found in *subplana* and *sculptilis*, although the latter has considerable affinity with *indentata*.

Gray (*Catal. of Pulmonata*, 1855) has the genus Zonites in the Family Arionidæ, but in a paper, "*On the Arrangement of the Land Pulmoniferous Mollusca into Families*" (*Ann. and Mag. of Nat. Hist. VI.*, 3*d Series*, 267, 1860), he suggests important changes in the arrangement proposed in the Catalogue. In the paper referred to he thus characterizes and remarks on the family Parmacellidæ, to which, as I understand it, he anticipates that Zonites will be found to belong:

> "Mantle central, large, shield-like, free in front, more or less covered with a spiral shell. Young and adult alike. Foot truncated behind, with a subterminal gland. *Parmacellus*, *Mariella*, *Laconia* (Cat. pp. 62, 63), *Vitrinella*, *Nanina*, and the allied genera, will probably be found to belong to this family when the animals are more closely examined."

With the description of Zonites, in which he places one American species only (*euryomphalus Pfr.*, from Guatemala), Gray introduces an account from Férussac (*Tab. Sys.* 10) of the animal of *H. algira L.*, the type of the genus, in which the following occurs:—"If the mucous pore does not exist in this species as in the Arions, a well marked slit is to be observed in its place, to which the grooves on the upper part of the foot tend."

Albers thus describes the Genus Zonites:—

> "Zonites Montfort. T. umbilicata, orbiculato-convexa vel depressa, striata vel decussata, subtus laevis, nitida; anfr. 6–7 sensim accrescentes; apertura obliqua, lunaris; perist. rectum, acutum, intus leviter labiatum.
>
> "Maxilla magna, simplex, parum arcuata, a latere attenuata, medio tuberculo valido, rostriformi munita. Palpi labiales distincti. Porus mucosus oblongus in apice pedis. Radula denticulis marginalibus elon-

gatis, aculeiformibus. Folliculi mucosi, bursa et sagitta amatoria desunt, flagellum obsoletum, vagina papillis mucosis orbiculatim circumdata." *Die Heliceen*, 2 *ed.* p. 65.

Albers divides the genus into two subgenera, viz. Aegopis Fitz. and Moreletia Pfr., of which *algirus L.* and *euryomphalus Pfr.* are the types. He has no American species excepting *euryomphalus* in the genus, and although extensively remarking on Dr. Binney's writings places *fuliginosa* and its allies in Mesomphix, a subgenus of Hyalina, in the description of the animal of which no reference is made to the mucous pore.

I should mention that Dr. Binney (*Terr. Moll.* II. 253), in his description of the animal of *H. suppressa Say*, adds: "On the upper surface of the extremity of the foot is a longitudinal fissure or furrow, from which mucus exudes in great quantities, and which the animal shuts and closes at will." I have very lately examined the animal referred to, and find the above statement correct. Dr. Binney does not allude to that character in his notice on the animal of the very closely allied *H. gularis Say*, which I have not at present seen. Looking at the shells various observations on the fulcrum and its modifications, but some further explanation on the subject is necessary.

The following species have the same form of that accessory process as prevails in *spinosa*, the type of Stenotrema, viz.:

H. monodon M. & R.
barbigera Redf.
Edvardsi Bld.
Edgariana Lea.
stenotrema Fér.
H. hirsuta Say.
labrosa Bld.
maxillata Gould.
leporina Gould.
pustuloides Bld.

A simple, small, transverse tubercle, which I have called a modification of the fulcrum, is found in—

H. pustula Fer.
tholus W. G. By.
" var. Mooreana W. G. By.
Dorfeuilliana Lea.
H. Troostiana Lea.
fastigans L. W. Say.
hippocrepis Pfr.
loricata Gould.

In my "Notes" above referred to I placed *H. Hazardi* in section "D. Lip reflected, with fulcrum;" but in my "Remarks" (*Annals* VI. 393) I more correctly described it as follows:—

> "In *H. Hazardi* the inferior tooth of the labrum, at its inner end, is continued back within the aperture, forming a white, erect lamella on the floor of the whorl, parallel with, and leaving a narrow sinus between it and the inner wall, to which it is joined at its extremity, about 2½ mill. from the edge of the peristome."

In *H. vultuosa* and its near ally *H. introferens*, the lamella on the lower lip is continued within the aperture, where it terminates in a somewhat diagonal, elevated callus.

The lamella in *Hazardi*, and callus in the two above named species, placed much nearer to their apertures than the fulcrum or tubercle in those enumerated in the two preceding lists, can scarcely, perhaps, be considered as modifications of the fulcrum.

It will be noticed that Albers places in Stenotrema *H. pustula*, also *H. Lecontii Lea* from California (the latter as *loricata Gould*, which name has priority, in Triodopsis), both having the tubercle as in *Troostiana* and other species put by Albers in

Polygyra. *H. germana Gould*, from California, also in Stenotrema, has no fulcrum or any modification of it.

H. spinosa and the species more immediately allied to it, having the same form of fulcrum, are grouped together in my Catalogue, while those having the tubercle and *H. Hazardi*, all polygyral in character, are separated from them. *H. leporina* and *pustuloides*, with the fulcrum of *spinosa*, are placed apart; in general form they seem also to belong rather to Polygyra than Stenotrema. *H. vultuosa* and *introferens* precede species determined by Albers to be in Triodopsis. *H. hippocrepis* (with the tubercle as in *pustula*), having a reflexed hook far within the aperture, connects the group in which the latter is placed with that embracing *auriculata* and its allies.

The value, as generic characters, of the *fulcrum* and *tubercle* above described (existing in North American species only, so far as I am informed), remains to be decided.

No scientific arrangement of the North American Helices can, however, be framed until more is known of the animals. Dr. Gray (*Ann. and Mag. of Nat. Hist. l. c.* 268) remarks on "the

Catalogue of the Species of Helix which inhabit North America (exclusive of the Pacific Coast and Mexico), arranged especially with reference to the forms of the Shells, and showing the Genera and Subgenera in which they are placed by Pfeiffer and Albers.

	PFEIFFER, 1855. *Malak. Blatt.*	ALBERS, 1860. *Die Heliceen.*
	GEN. HELIX. *Subgenera.*	GEN. HYALINA. *Subgenera.*
fuliginosa Griff.	Hyalina	Mesomphix
kopnodes W. G. Binn.	=	=
friabilis "	=	=
caduca Pfr.	"	Ammonoceras
inornata Binn.	=	Mesomphix
subplana "	=	"
laevigata Raf.	"	"
sculptilis Bld.	=	=
*		
cellaria Müll.	"	Hyalina
nitida "	"	"
hydrophila Ing.?		
†arborea "	"	"
limatula Ward	"	"
viridula Menke	"	"
electrina Gould		
indentata Say	"	"
*		
Elliotti Redf.	=	=
*		
demissa Binn.	"	Mesomphix
capsella Gould	=	"
ligera Say	"	"
intertexta Binn.	"	"
*		
fulva Drap.	Conulus	Conulus
chersina Say		
egena " ?		
Fabricii Beck	"	"
Gundlachi Pfr.	"	"
*		
gularis Say	Gastrodonta	Gastrodonta
suppressa Say	"	"

NOTE.—The species marked — in the columns of the above Catalogue are not named by the Authors in the lists quoted.

	Pfeiffer, 1855. *Malak. Blatt.*	Albers, 1860. *Die Heliceen.*
	Gen. Helix. *Subgenera.*	Gen. Hyalina. *Subgenera.*
lasmodon Phill.	=	Gastrodonta.
*		
interna Say	Actinaria	"
multidentata Binn.	"	"
lineata Say	"	"
*		
†polygyrella Bld. & Coop.	=	=
*		
labyrinthica Say	Mesodon	"
Hubbardi Brown	=	=
*		
†Vancouverensis Lea	Macrocyclis	Macrocyclis (Gen.)
var. sportella Gould.	=	Patula (Helix)
concava Say	"	Macrocyclis (Gen.)
*		Genus Helix *Subgenera*
minuscula Binn.	Hyalina	Microphysa
milium Morse	=	=
minutissima Lea	=	=
vortex Pfr.	"	"
incrustata Poey	Patula	"
*		
asteriscus Morse	=	=

	Pfeiffer, 1855. *Malak. Blatt.*	Albers, 1860. *Die Heliceen.*
	Gen. Helix. *Subgenera.*	Gen. Helix. *Subgenera.*
avara Say	Daedalocheila	Polygyra
espiloca Rav.	=	=
Postelliana Bld.	=	=
auriculata Say	“	“
uvulifera Shuttl.	“	“
Ariadnæ Pfr.	“	“
*		
hippocrepis Pfr.	“	“
*		
pustula Fér.	Isogonostoma	Stenotrema
tholus W. G. Binn.	=	=
“ var. Mooreana W. G. B.	=	=
Dorfeuilliana Lea	Ulostoma	=
Troostiana “	Daedalocheila	Polygyra
fastigans L. W. Say	“	“
*		
Hazardi Bld.	=	=
*		
leporina Gould	=	Stenotrema
pustuloides Bld.	=	=
*		
monodon M. & Rack.	Ulostoma	“
barbigera Redf.	=	“
Edvardsi Bld.	=	=
spinosa Lea	Tridopsis	“
Edgariana Lea	“	“
stenotrema Fér.	=	“
hirsuta Say	“	“
labrosa Bld.	=	=
maxillata Gould.	“	“
*		
vultuosa Gould	Ulostoma	Triodopsis
introferens Bld.	=	=
*		
inflecta Say	Isogonostoma	“
Rugeli Shuttl.	=	“
†Mullani Bld. & Coop.	=	=
Hopetonensis Shuttl.	Ulostoma	“
tridentata Say	“	“
fallax “	“	“
palliata “	“	“
obstricta “	“	“
appressa “	“	“
*		
elevata “	Mesodon	“

	Pfeiffer, 1855. *Malak. Blatt.*	Albers, 1860. *Die Heliceen.*
	Gen. Helix. *Subgenera.*	Gen. Helix. *Subgenera.*
Clarkii Lea	=	=
*		
Christyii Bld.	=	=
*		
thyroides Say	Mesodon	Mesodon
bucculenta Gould	=	"
Wheatleyi Bld.	=	=
exoleta Binn.	"	"
albolabris Say	"	"
" var. major Binn.	"	"
dentifera Binn.	Ulostoma	"
Roemeri Pfr.	"	"
profunda Say	"	"
Sayii Binn.	"	"
*		
multilineata Say	Mesodon	"
Pennsylvanica Green	"	"
clausa Say	=	Triodopsis
Mitchelliana Lea	"	Mesodon
Downieana Bld.	=	=
divesta Gould	=	Triodopsis
*		
harpa Say	=	Acanthinula
*		

Descriptions of the principal Genera and Subgenera in which certain North American Species of Helix are arranged by Albers, "Die Heliceen," 2d Ed.

GENUS XI.

Hyalina (Fér.) Gray.

Testa plerumque umbilicata, tenuis, nitens, vitrea vel fusco-cornea; anfr. 5–7 regulariter accrescentes, ultimus non descendens, sæpe antice dilatatus; spira depressa, rarissime orbiculato-conica; apertura rotundato-lunaris; perist. tenue, acutum, rectum.

Animal: maxilla simplex (nec sulcata nec dentata), arcuata, margine inferiori acuto, medio rostriformiter prominente. Apertura respiratoria latere dextro supra collare, genitalis ad basin colli. Systema sexuale simplex, sagitta amatoria ejusque bursa et folliculi mucosi omnino desunt; flagellum parvum vel nullum, musculus retractor penis brevissimus. Dentes linguæ (radulæ) laterales elongati, hamiformes, lateribus non denticulati.

1. Hyalina s. str.

Testa umbilicata interdum perforata, depressa, vitrea, nitida; anfr. 5–6 regulariter accrescentes; spira rarissime conico-elevata; apertura rotundato-lunaris; perist. tenue, acutum, rectum.

Flagellum breve (Moq.-Tand.).

2. Mesomphix* Raf.

Testa umbilicata vel perforata, globoso-depressa, tenuis, striatula, fusco-cornea, subtus pallidior, nitida; anfr. 4½–6, apertura lunari-ovata; perist. simplex, rectum, acutum, marginibus conniventibus, columellari reflexiusculo. Flagellum nullum; bursa copulatrix apice angusta, canali brevi. (Moq.-Tand.)

4. Ammonoceras Pfr.

Testa late et perspective umbilicata, depresse orbicularis, nitida, pellucida, tenuis, radiatim striata; spira planiuscula; anfr. 4–7 parum convexiusculi, ultimus auctus, antice non descendens, ad peripheriam rotundatus; apertura perobliqua, ampla, rotundato-lunaris; perist. simplex, acutum, marginibus conniventibus.

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* "Mesomphix umbilicus expanded, exhibiting the volutions." *Raf.* Vide *Terr. Moll.* I. 49.

6. Conulus (Fitzinger) Moq.Tand.

T. imperforata, vel angustissime perforata, turbinata, arctispira; anfr. 5–6, convexiusculi; apertura depresso-lunaris, anfr. penultimo valde excisa, parum obliqua. Perist. marginibus remotis.

Maxilla carina verticali parum expressa, rostro mediano brevi, obtuso. Tentacula inferiora crassa.

7. Gastrodonta Albers.

T. subperforata vel umbilicata, orbiculato-convexa, corneo-diaphana, vitrea, plus minusve ruguloso-striata; anfr. 5–7; apertura lunaris, basi dentibus pliciformibus, marginem non attingentibus, sæpissime munito; perist. simplex, acutum.

GENUS XII.

Macrocyclis Beck.

T. tenuis, late umbilicata, depressa, striata vel rugulosa, concolor, anfr. 4½–5, ultimus latus, depressus, antice modice descendens; apertura oblique ovata; perist. subincrassatum vix expansiusculum, margines approximati, basalis breviter reflexus.

Maxilla arcuata, medio rostrata, tota costulis confertis marginem non attingentibus exarata.

GENUS XV.

Maxilla costis numerosis, parum prominentibus, margine crenato. Folliculi mucosi, sagitta, capreolus, flagellum desunt.

15. POLYGYRA Say.

T. umbilicata vel perforata, orbiculato-planata, oblique costulato-striata; anfr. 5–7½ lente accrescentes, ultimus antice constrictus, breviter deflexus, basi inflatus, devians, penultimus plane conspicuus, perforationem sæpissime rimatim constringens; apertura subreniformis vel irregulariter sinuata; perist. anguste reflexum, callosum, marginibus interdum dentatis, callo triangulari, dentiformi, in parietem aperturialem oblique intrante junctis.

16. STENOTREMA[*] Raf.

T. obtecte perforata, lenticularis vel globoso-depressa, pilosula; anfr. 4½–6, ultimus antice gibbus, breviter deflexus, basi tumidus; spira parum elevata; perist. albo-labiatum, margine supero breviter reflexo, basali strictiusculo, saepe sinuoso dentato.

In quarta parte circuitus anfractus ultimi ante aperturam, columella appendice callosa, lamelliformi, cavationem anfractus coarctante, munita est.

17. TRIODOPSIS[†] Raf.

T. obtecte perforata vel umbilicata, orbiculato-depressa vel subglobosa, plus minus oblique striata; anfr. 5–7, ultimus antice paululum deflexus; apertura sinuoso-coarctata, subtriangularis; perist. albo-callosum, late angulatim reflexum; paries aperturialis dente valido, oblique intrante munitus. Maxilla costis 3–5, prominentibus, margine dentato. Folliculi mucosi 2, simplices. (Moq.-Tand.) Sagitta 1 subconica, parum arcuata, basi biangulata, elongata. (Ad. Schmidt.)

18. MESODON[‡] Raf.

T. umbilicata vel obtecte perforata, subglobosa vel orbiculato-depressa, tenuis, subtiliter striata, interdum decussatim sculpta; anfr. 5–6 regulares; apertura rotundato-lunaris, interdum dente parvulo in pariete aperturiali coarctata; perist. albo-labiatum, expanso-reflexum, margine basali rare unidentato.

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[*] "CHIMOTREMA.—Aperture transverse, extremely curved, resembling a simple fissure.

"TOXOTREMA.—Differs from the preceding by the emarginate lip.

"STENOTREMA.—Differing from the two preceding by a thick emarginate lip, and a second lip flattened to the spire and uniting with the true lip; a transversal carina above."—*Raf.* Vide *Terr. Moll. l. c.* 49.

[†] "TRIODOPSIS.—Umbilicus large, lip thick, aperture narrowed by three teeth, one upon each lip and one upon the columella." *Raf.* Vide *Terr. Moll. l. c.* 49.

[‡] "MESODON.—Differs from Helix by lower lip with a tooth." *Raf.* Vide *Terr. Moll. l. c.* 49.

Maxilla costis crassis circa 10, valde prominentibus.

20. ACANTHINULA Beck.

T. perforata, globoso-turbinata, vel epidermide brunnea, costulato-plicata vel aculeata induta; anfr. 4–5; apertura rotundata; perist. tenue, expansiusculum, marginibus approximatis.

Tentacula inferiora et palpi labiales sat magna. (Moquin Tandon.)

21. VALLONIA Risso.

T. umbilicata, depressula, diaphana; anfr. 3½–4; apertura obliqua, subcircularis; perist. candidum, labiatum, reflexum, marginibus contiguis vel conniventibus.

Maxilla costis numerosis, margine parum crenulato. Folliculi mucosi nulli? Sagitta 1, longa, conica, lævis. (Goldfuss.)

23. FRUTICICOLA Held.

T. umbilicata vel perforata, depresso-globosa, interdum pilosa; anfr. 5–7 convexiusculi; apertura late lunaris vel lunato-rotunda; perist. acutum, brevissime expansum, intus labiatum, margine basali reflexo.

Maxilla costis numerosis (usque 20), margine subtiliter crenulato. Folliculi mucosi plerumque 2, bi-quinquefidi. Sagitta 1–2, conica, arcuata, apicem versus aciebus instructa. Vesicula pedunculata magna,

ADDENDUM.

The foregoing paper relates especially to species of Helix which inhabit North America, *exclusive of the Pacific Coast and Mexico.* I used the term "Pacific Coast" as employed by W. G. Binney in his "Check Lists" published by the Smithsonian Institution, in which lists the species of the "Pacific Coast from the extreme north to Mazatlan" are separated from those of "Eastern North America from the boreal regions to the Rio Grande," the Rocky Mountains being considered as the dividing line of the two faunas. My Catalogue, however, embraces species (indicated by a †) collected by Dr. J. G. Cooper on the *Pacific* side of the Rocky Mountains, several of which species occur also on the *Eastern* side; I refer particularly to *H. arborea*, *striatella*, and *solitaria*. Under these circumstances, and having been requested to do so, I annex the following Catalogue of species arranged in the order adopted by Albers, including those marked = which he does not mention. I add his descriptions of two Subgenera of Helix which are not represented in Eastern North America.

Catalogue of the Species of Helix which inhabit North America West of the Rocky Mountains, from the extreme North to the northern limits of Mexico, exclusive of those marked † in the preceding Catalogue.

	ALBERS, 1860. *Die Heliceen.*	
cultellata Thomson	=	This belongs probably to Zonites.
fulva Drap.	Conulus.	
Newberryana W. G. Binn.	=	
germana Gould	Stenotrema	
loricata "	Triodopsis	
vultuosa Gould	"	

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* A number of new species have been discovered in the prosecution of the Geological Survey of California and otherwise, specimens of some of which I have received. At a late date descriptions of them had not been published.

	Albers, 1860. *Die Heliceen.*	
devia Gould	Mesodon	
Syn. Baskervillei Pfr.		
labiosa Gould	"	
Syn. Columbiana Lea		
fidelis Gray	Aglaja	
infumata Gould	=	
Dupetithouarsi Desh.	Arionta	
Californiensis Lea	"	
Syn. vincta Val.		
Nickliniana Lea	"	
tudiculata Binn.	"	
arrosa Gould	"	
olim aeruginosa Gould		
levis Pfr.	"	
Kelletti Forbes	"	
Pandorae "	"	
exarata Pfr.	"	
reticulata Pfr.	"	
redimita W. G. Binn.	=	With this and the following species marked = I am almost entirely unacquainted, but they seem to belong to Arionta.
intercisa "	=	
ramentosa Gould	=	
Ayersiana Newc.	=	
Bridgesii "	=	
Carpenteri "	=	
Mormonum Pfr.	=	
Traskii Newc.	=	

IV.—*Descriptions of* NEW SPECIES *of Birds of the Families* TANAGRIDÆ, CUCULIDÆ, *and* TROCHILIDÆ, *with a Note on* PANTERPE INSIGNIS.

BY GEO. N. LAWRENCE.

Read June 18th, 1864.

FAM. TANAGRIDÆ.

1. **Saltator fulviventris**, nov. sp.

Entire upper plumage and sides of the head dull olive green; quills blackish brown edged with olive green; tail feathers blackish brown with greyish olive margins; superciliary stripe yellow; chin and throat pale fulvous, deeper in color on the lower part, and bordered on each side with a line of black; breast fulvous tinged with olive, abdomen reddish fulvous; under tail coverts rather light rufous; under wing coverts pale reddish fulvous, outer edge of shoulder pale yellow; sides under the wings brownish olive; bill black at the base, fleshy brown at the end; tarsi and toes brown.

Length about nine inches; wing 4; tail $4\frac{1}{4}$; bill $\frac{11}{16}$; tarsi 1.

Habitat.—Paraguay. Collected on Capt. T. J. Page's Expedition; marked on the label "eyes dark green, legs dark."

Remarks.—This does not appear to resemble any species with which I am acquainted; the yellow superciliaries, fulvous under coloring, and dark tail with an olive upper plumage, seem peculiar characteristics.

2. **Tachyphonus tibialis**, nov. sp.

Male. Head, cheeks, chin, wings, and tail deep black; ear coverts, upper and under plumage fuliginous or sooty black, darker on the back and rump, greyish on the hind neck and under surface; upper part of the breast tinged with yellowish olive; thighs of a clear light yellow; bill black; tarsi and toes dark brown.

Length $7\frac{1}{4}$ inches; wing $3\frac{3}{8}$; tail $3\frac{3}{4}$; bill $\frac{1}{2}$; tarsi 1.

Habitat.—Costa Rica, San Jose.

The specimens of the Family Tanagridæ, belonging to the Smithsonian Institution, were sent me for examination by Prof. Baird; among them were the two species above named, which I think have not been heretofore described.

3. **Tachyphonus Napensis,** nov. sp.

Male. Glossy black; crest of a reddish fulvous orange; smaller wing coverts, and also the under wing coverts white; rump and hypochondriacal region chestnut; bill and feet black.

Length 6 inches; wing $3\frac{1}{8}$; tail $2\frac{1}{16}$; bill $\frac{1}{2}$; tarsi $\frac{5}{8}$.

Habitat.—Napo River. In my collection.

Remarks.—Somewhat like *T. surinamus*, but smaller, the crest deeper in color and less in extent; the most marked difference, however, is in the color of the rump, which is reddish chestnut, instead of pale fulvous, as in *T. surinamus.*

Remarks.—Obtained by Mr. Alexis A. Julien, in compliment to whom I have named it.

Differs from the other yellow-billed West India species, in being without any rufous coloring below or on the quills.

FAM. TROCHILIDÆ.

5. **Urochroa leucura,** nov. sp.

Upper plumage shining grass green, becoming coppery-bronze on the rump and upper tail-coverts; two central tail feathers dull bronzy green, blackish purple at the end, the four other feathers on each side white, the outer feather margined broadly and the other feathers narrowly on the outer webs, with dull black, and a narrow edging of the same color near the end on the inner webs of the three outer ones, but a broader margin on that of the feather next the central; wings brownish purple; throat brilliant dark blue; chin, sides of the neck, breast, and sides of the abdomen shining green; middle of abdomen dull dark ash; under tail-coverts bronzed coppery olive; bill and feet black.

Length $5\frac{1}{2}$ inches; wing $2\frac{7}{8}$; tail $1\frac{3}{4}$; bill $1\frac{3}{16}$.

Habitat.—Ecuador.

Remarks.—This is closely allied to *U. Bougueri* (Bourc.). It may possibly be that species, and it is with some hesitation that I venture to describe it as distinct; there are some differences, however, of color and markings which I cannot reconcile.

Mr. Gould, in Monog. Troch. (where a fine figure of *U. Bougueri* is given) describes that species as having the sides of the head and the upper plumage of a dark coppery bronze, becoming brighter or more coppery on the upper tail-coverts. In the present bird, with the exception of a very slight tinge on the crown, the rump and upper tail-coverts only are coppery, the rest of the upper plumage being green. The two species differ materially in the color of the tail. Mr. Gould states that *U. Bougueri* has "the two centre and the outer tail feather on each side purplish black; the remaining tail-feathers white, broadly margined externally, etc., with purplish black." In my species the central feathers are dark green, and all the others white, margined with dull black.

. Two specimens examined differ only in one (apparently not so mature), having the inner web of the feather on each side, next the central ones, almost entirely black, clouded white in the middle.

6. **Urosticte ruficrissa**, nov. sp.

Male. Entire upper plumage deep grass green; wings brownish purple; tail-feathers dull bronzy green, the four central largely tipped with pale creamy white, below the white these feathers are washed with coppery bronze, the other tail feathers being also largely so towards their ends; throat of a deep luminous emerald green; breast and abdomen grass green; crissum of a rather light rufous; bill black; feet dark brown.

Length about $4\frac{1}{4}$ inches; wing $2\frac{5}{16}$; tail $1\frac{13}{16}$; bill $\frac{7}{8}$.

Habitat.—Ecuador.

Remarks.—In a collection from Ecuador, I was much gratified by finding a second species of this remarkable form, the feathers of fiery crimson which terminate with violet purple; under plumage dull brownish olive; vent light fulvous grey; under tail-coverts dull bronzy olive green, each feather margined narrowly with greyish fulvous; bill and feet black.

Length $5\frac{1}{4}$ inches; wing $3\frac{3}{4}$; tail $2\frac{7}{8}$; bill $\frac{9}{16}$.

Habitat.—Bolivia, La Paz.

Remarks.—This exceeds in size any species of the same genus, the wings longer and the bill stouter, the feet and claws are strikingly large and strong.

The only species it at all resembles is *R. heteropogon*, but that has a bright green crown, and the upper plumage is of a shining green and reddish bronze, whereas the one now described is of a uniform olive; the feet and bill of *R. heteropogon* are feeble compared with those of the new species, the feet and claws of which are twice the size of those in the other.

The above described species, received at the Smithsonian Institution in a collection from Bolivia, was sent to me for examination; it also contained some valuable additions to their museum, viz. *Oreotrochilus Estellæ*, *Ramphomicron Stanleyi*, etc.

In a collection from Costa Rica, also belonging to the Smithsonian Institution, I found a specimen of *Panterpe insignis*, Cab.; the example described by Mr. Cabanis was, I believe, unique at the time it was figured by Mr. Gould in his Monograph of the Trochilidæ. The specimen agrees exactly with Mr. Cabanis's description; it is a very beautiful and well marked species. In the same collection are specimens which I have concluded to be females of this species, and of which I add a description, as this sex has not been heretofore known. It differs in some of its colors and markings very decidedly from the male, and but for their coming together I should have been at a loss where to place them.

Panterpe insignis, female.

Upper plumage shining grass green, crown duller and of a coppery tinge; middle tail feathers bronzy grass green, the other tail feathers of this color except one third at their ends, where they are black ending in very pale buff; wings purplish brown; a broad white mark extends back from the eye over the ear, below which is a broad mark of black running from under the eye down the side of the neck; entire under plumage dark rufous; thighs black as in the male; bill black; under tail coverts greyish buff.

Length 4 inches; wing $2\frac{5}{16}$; tail $1\frac{3}{8}$; bill $\frac{12}{16}$.

V.—*Summary of a* METEOROLOGICAL REGISTER *for the Year* 1863, *kept in the City of New York.*

BY PROFESSOR ORAN W. MORRIS.

Read June 13th, 1864.

THE year 1863 was warmer than any year for the last ten, being 1.62° more than the mean, and .369° more than 1861, 30.719 inches, a rise of 1.513 inches. The quantity of water that fell in rain and snow was greater than in any except in 1859 and 1862. Rain fell on 10, and snow on 6 days. The prevailing wind was north-east. Lunar haloes were observed four times, and shooting stars once.

February was warmer than any February, except in 1857 and 1859. The temperature was variable, for at 9 P.M. of the 1st the thermometer indicated 45°, and at 9 P.M. of the 4th it was 6°. At 2 P.M. of the 6th it had risen to 47.5°. The barometer rose from 29.756 in. at 7 A.M. of the 2d to 30.912 in. at 9 P.M of the 4th. It fell again from 7 A.M. of the 18th to 7 A.M. of the 20th from 30.350 to 29.215 in., then rose again, so that at 7 A.M. of the 22d it stood at 30.515 in. The quantity of water that fell was greater than in any other February. Rain fell on 10, and snow on 5 days. The prevailing wind was north-east.

March was colder than any March, except in 1856, though nearly the same as in 1855. The weather was as fickle as usual, but no *great* changes. More water fell than in any March, except in 1859. Snow fell on 11, and rain on 10 days. The prevailing wind was west. Lightning occurred on the 25th. A parhelion, a solar halo, and the zodiacal light, were each observed once.

April was about the average temperature. The mercury in the thermometer varied, but not greatly; in the barometer it fell .937 inch. from 2 P.M. of the 21st to 9 P.M. of the 24th. The quantity of rain was about the average. Snow fell in slight quantities on 3 days, and rain on 14. The aurora-borealis, also a solar halo, a lunar halo, and a parhelion, were each noticed once.

May was warmer than any May except in 1859 and 1862. The temperature was variable, and so was the mercury in the barometer till the 29th, when it commenced falling, and continued to do so till 2 P.M. of the 31st, when it was at its lowest point of the month. The quantity of rain was near the average. Rain fell on 12 days. The prevailing wind was south-west.

There were four thunder-showers. Lightning without thunder four times, and one rainbow was observed.

June was about the average temperature, and generally quite uniform, no very great changes occurring either in the thermometer or the barometer. The quantity of rain was the smallest of any of the ten years; it rained on 8 days. The prevailing wind was west. There were two thunder-showers. Lightning occurred once, alone; thunder alone, once; and a parhelion was once noted.

July was warmer than any other July for the ten years, and quite uniform in temperature, but the barometer fell on the 20th and 21st almost half an inch. The quantity of rain was greater than in any July of the ten years. Rain fell on 20 days. The prevailing wind was south-east. There were 12 thunder-showers; and lightning occurred once.

August was also warmer than any August, with only one change of moment; on the 25th the mercury fell 17° in as many hours; the barometer remained quite uniform till just at the close of the month, when it rose .495 inch. The quantity of rain was more than the average. It rained on six days. The

November was warmer than any November in the ten years. The temperature was variable, but no great changes. On the 21st the barometer rose after 9 P.M. till 7 A.M. of the 23d, .665 inch.; it then fell till 7 A.M. of the 25th, .66 inch.; then rose till 2 P.M of the 27th, and fell on the 28th .7 inch. The quantity of rain was less than the average; it fell on 10 days, and snow on 4 days. The prevailing wind was west. The aurora-borealis, a lunar halo, and a meteor, were each observed once.

December was 1.593° warmer than the average of Decembers; the thermometer varied considerably, falling 28.3° from 2 P.M. of the 9th to 7 A.M. of the 11th; then rising 37.7° to 2 P.M. of the 13th. The barometer was 30.679 inches on the 7th at 7 A.M., and fell to 29.927 on the 9th at 2 P.M; rose to 30.47 on the 11th at 7 A.M., and then fell to 29.276 on the 14th at 7 A.M., with some other great changes before the close of the month. The quantity of water was nearly the average; rain fell on 9 days, and snow on 3. The prevailing wind was west. Lunar haloes were observed three times; a rainbow, a parhelion, and a meteor, each once.

For the year the maximum of the thermometer was 95°, being less than 1859 and 1862, and the same as 1854; the minimum was greater than any year except 1862. The maximum of the barometer was greater, and the minimum greater also, except for 1858 and 1860. The extreme range of the thermometer was less than any year except 1862, and that of the barometer greater than the others except 1856 and 1857. The prevailing wind was the same as 1857, 1861, and 1862.

A fact has been illustrated, in making a chart of the weather for the year, that I will mention, although I presume others have noticed the same: About the time that the thermometer makes a great rise the barometer falls, and so *vice versa*. It can be seen better by a chart than by the figures, and illustrates one of the laws of meteorology very finely.

TABLE OF TEMPERATURE, Etc.

1863.		Barometer.				Thermometer.				Rain & melted Snow.	Pre-vailing Wind.
		7 A.M.	2 P.M.	9 P.M.	Mean.	7 A.M	2 P.M	9 P.M	Mean.		
Jan.	Max.	30.748	30.743	30.779		56.8	54.0	48.3			
	Min.	29.216	29.258	29.367	30.047	15.0	24.8	19.0	37.245	5.45	N.E.
Feb.	Max.	30.906	30.720	30.912		45.6	50.3	45.0			
	Min.	29.395	29.432	29.474	30.154	8.0	11.0	6.0	33.90	7.04	N.E.
March	Max.	30.588	30.505	30.520		52.0	55.0	49.6			
	Min.	29.638	29.538	29.547	30.002	14.0	21.5	19.0	35.37	5.77	W.
April	Max.	30.364	30.369	30.363		55.5	72.3	63.0			
	Min.	29.437	29.315	29.432	29.903	30.0	32.5	34.5	49.03	5.69	N.W.
May	Max.	30.071	30.039	30.084		76.0	88.5	79.0			
	Min.	29.534	29.367	29.453	29.892	41.8	45.5	41.0	62.99	4.58	S. W.
June	Max.	30.153	30.153	30.168		75.1	90.0	73.2			
	Min.	29.410	29.407	29.545	29.881	56.0	62.2	57.8	69.376	1.43	W.
July	Max.	30.102	30.122	30.120		83.0	87.3	82.0			
	Min.	29.584	29.557	29.657	29.911	66.7	74.0	69.8	77.536	8.60	S.E.
Aug.	Max.	30.211	30.230	30.260		85.2	95.0	89.0			
	Min.	29.799	29.821	29.803	29.970	62.0	69.3	61.0	79.45	4.59	W.
Sept.	Max.	30.471	30.468	30.430		75.0	84.7	77.0			
	Min.	29.703	29.450	29.656	30.040	45.8	56.0	49.8	65.688	1.05	N.W.
Oct.	Max.	30.414	30.389	30.406		67.0	75.0	67.2			
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

VI.—*On* AMMOBROMA, *a New Genus of Plants, allied to Corallophyllum and Pholisma.*

BY JOHN TORREY.

Read June 27th, 1864.

THIS singular plant was discovered in the year 1854 by the late Col. Andrew B. Gray, in his survey and explorations for ascertaining the practicability of constructing a southern railway to the Pacific. It was found in abundance on a range of sandhills near the head of the Gulf of California, and is not known to occur elsewhere.

A brief notice of the plant was given in a memoir by Prof. A. Gray, entitled *Plantæ Novæ Thurberianæ*, which was published in the fifth volume of the Memoirs of the American Academy of Arts and Sciences, in the year 1854. A full description was reserved for Col. Gray's complete narrative of his expedition. Various causes have hindered the publication ot this work, and as it is now doubtful whether it will ever make its appearance, owing to the recent death of that gentleman, it seems proper that one of the most interesting of the scientific results of his labors should no longer be withheld.

The following are the characters of the new genus, taken from dried specimens presented to me by Mr. Gray, and from a drawing made from the living plant by Mr. C. Schuchard, who accompanied the expedition as draughtsman.

AMMOBROMA*, TORR.

Calyx deeply 10-parted; the divisions setaceous, plumose. Corolla monopetalous, tubular-funnelform, somewhat plicate; the border 6-lobed;

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* From αμμος, sand, and βρωμος, food; in allusion to its place of growth, and the use made of the plant by a tribe of Indians.

lobes short and emarginate. Stamens 6-10, inserted above the middle of the tube of the corolla in a single series, included; filaments very short; anthers oblong, 2-celled; the cells opening longitudinally. Ovary oblate-globose, 15–20-celled; the cells arranged in a marginal circle around a thick central axis; style elongated, rather stout, straight, included; stigma sub-capitate, depressed in the centre, the margin crenate. Ovules single in each cell and fixed to the inner angle, at first nearly hemitropous, but becoming anatropous; the micropyle superior. Fruit (immature) depressed, the dehiscence apparently localicidal. Endocarp chartaceous, separating readily from the rest of the fruit, which is apparently somewhat fleshy. Plant herbaceous and fleshy, of a dull orange color, parasitical on the roots of an unknown shrub. Stem simple, scaly, almost entirely buried in the sand, the summit expanded into a shallow cyathiform head or receptacle, which is densely lined with small, pedicellate, purplish ebracteate flowers.

Ammobroma Sonoræ.

PLATE I.

Habitat.—State of Sonora, Northern Mexico, in the sandy the length of the calyx, purple and plicate towards the summit; the border 6-lobed, with the lobes erect and slightly emarginate. Stamens 5–10 (mostly about 8), inserted near the upper third of the corolla; the filaments very short, triangular-lanceolate, blue; anthers obtuse at each end. Pollen simple, obtusely, but distinctly triangular. Ovary orbicular and somewhat flattened, mostly about 20-celled, the cells marginal and surrounding a thick fleshy central axis. Style cylindrical, about two-thirds the length of the corolla; stigma capitate, somewhat lobed or crenulate. Ovules suspended on a short funiculus. Mature front not seen.

In a business Report of Col. Gray to the Texas Western Railroad Company, published at Cincinnati in 1856, is the following notice of the plant: "West of Tucson and Tubac, towards the Gulf of California, the country presents more the appearance of a barren waste or desert than any district I have seen. It is the country of the Papigo Indians, a peaceful and friendly tribe, extending down the Gulf coast, where they are mixed up somewhat with the Cocopas of the Colorado. From Sonoita I explored the Gulf shore near the mouth of Adair Bay. This bay is completely encircled by a range of sand-hills, reaching north-west to the Colorado river, and southward as far as the eye could discover. The "sables" are probably eighty or ninety miles in extent by five to ten broad. Notwithstanding it appears to be the most desolate and forlorn-looking spot for eighty miles around the head of the Gulf, the sand-hills looking like a terrible desert, nature seems even here, where no rain had fallen for eight months, to have provided for the sustenance of man one of the most nutritious and palatable vegetables. In this naked spot I found a band of Indians (Papigos) almost in a state of nudity, living on fish and crabs caught in the salt creeks and lagoons of the Gulf; and a sort of root, which was eaten after roasting upon hot coals or dried in the sun, and ground on a *metate* (curved stone) with mesquit beans, forming "Pinole." In the latter state it was not so palatable as ours made of parched wheat or corn; but the vegetable itself, when first gathered and cooked, was very luscious, and resembled in taste the sweet potato (batatas), only far more delicate. It is very abundant in the hills; the whole plant, except the top, buried in the sand, apparently attached to some other root or substance."

There is not much probability that the Ammobroma can be cultivated, as it seems to be a true parasite; yet it is possible that it may be propagated by transplanting it along with the living roots to which it is attached.

The only known genera to which the Ammobroma is nearly allied are Corallophyllum of H. B. and Kth.* (or rather Lennoa of Llave and Lexarza†), and Pholisma of Nuttall. The former has been found only near the City of Mexico, and no botanist appears to have noticed it since the original descriptions of the plant were published, about forty years ago. It differs from the other two related genera in having a corymbosely branching cespitose stem, with the fleshy leaves (or rather scales) deeply and irregularly laciniate, and the stamens in a double series. The principal figure in the *Nov. Gen. et Spec. Plant.* does not clearly show the mode of inflorescence, but the flowers undetermined. Kunth (l. c.) expressed no opinion as to the place of Corallophyllum in the Natural System, and he seems to suspect that the plant he examined was in an abnormal condition. It is left by him among his "*genera incertæ sedis.*" Endlicher also places it with "*genera dubiæ sedis.*"

Sir W. Hooker, who first described Pholisma, from Nuttall's specimen, and gave a good figure of the plant in his Icones Plantarum (l. c.), regards it as nearly related to Corallophyllum, and refers it to Orobanchaceæ, though he thinks it will yet form a distinct group near that order, but with a very different fruit. Walpers follows Hooker without comment. Lindley* places both genera, with a mark of doubt, at the end of Monotropaceæ, which they certainly resemble much more than they do Orobanchaceæ. Like the former they are parasitical on roots; and in the spiked inflorescence of Pholisma there is an approach to Hypopithys. Most of the genera of Monotropaceæ are gamopetalous, and in half of them the anthers open by longitudinal slits.† The pollen, also, is simple and spherical.

On the other hand, Corallodendron and Pholisma, as well as

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* Vegetable Kingdom, p. 452.

† Viz. In Pterospora, Allotropa, Torr. and Gray (in Bot. Wilkes's Expl. Exped. ined.), and Hemitomes, Gray, in Newberry's Bot. of Williamson, and Abbot's Pacif. Railroad Expl. An examination of good specimens of Hemitomes, collected in Washington Territory by George Gibbs, Esq., shows that the anthers are distinctly 2-celled; but they open and discharge their pollen even before the flower is expanded. The lines of dehiscence are near the connective. After opening, the broader portion of the cells is rolled backwards till each nearly meets its fellow, forming a large and spurious cell. A narrow portion of each proper cell is left. These also incline towards each other, so that another smaller, spurious, and apparently abortive cell is formed. Hence, after flowering the anther might easily be regarded as only one-celled by abortion. An examination of an unexpanded flower shows the true structure of the anther; and proves that in the withered state the spurious cells are at right angles to the normal ones. Hence the name Hemitomes is quite inapplicable, and I propose that it be changed to Newberrya, in honor of the first discoverer of the plant, who has distinguished himself by investigating the recent and fossil botany of the Western and Pacific States.

Ammobroma, differ from Monotropaceæ in the stamens being perigynous not hypogynous, with the pollen distinctly triangular; and in the numerous cells of the ovary with only a single ovule in each cell. As the mature fruit is unknown we are uncertain as to the character of the seeds, but there is no indication of their being loose-skinned. On the whole, therefore, it would seem that these three genera form a very natural group by themselves, which may be regarded as a tribe or suborder, to be named Lennoeæ; the genus Lennoa having been published by Llave & Lexaza a year earlier than the Corallophyllum of H. B. & Kunth.

DESCRIPTION OF THE PLATE.

Fig. 1. Upper part of the plant of the natural size.
" 2. Longitudinal section of the same, showing the mode of inflorescence.
" 3. A portion of the root, and that of the plant to which it is attached as a parasite.
" 4. A flower, magnified.
" 5. One of the divisions of the calyx, more magnified.

VII.—*Notes on Species of the Family* CORBICULADÆ, *with Figures.*

BY TEMPLE PRIME.

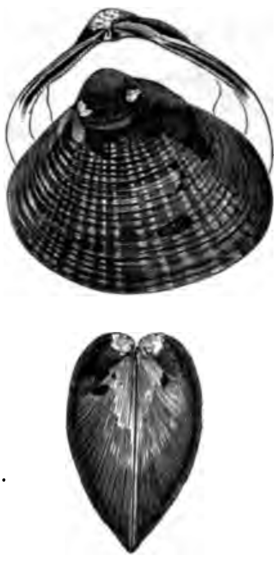
Read June 27, 1864.

Genus CORBICULA.

1. **Corbicula pexata,** nov. spec.

C. testa trigona, ovato-transversa, inæquilaterali, compressiuscula; latere antico rotundato, postico longiore, productiore, obtuso; umbonibus tumidis, approximatis; valvis tenuibus, intus violaceo-candidis; ligamento modico; profunde striata; epidermide nitente, olivaceo-brunnea, fusco-maculata induta, aliquantisper lineis radiata; lunula inconspicua; dentibus lateralibus pallide violaceis.

FIG. 1.



Corbicula pexata.

Long. 36; lat. 30; diam. 19 mill.

Hab.—In flumine Fuh-chan, Chinae. Collect. Prime.

In outline the shell is trigonal, transversely oval, inequilateral. The anterior side is rounded and the posterior side is longer, more produced and abrupt. The valves are light; the cavity of the shell is not very deep, and the color of the interior varies from white to violet. The teeth offer no distinctive characters; the lateral teeth are often violet. The beaks are somewhat full, they are considerably raised above the outline of the margin and they are approximate. The sulci are regular, close, raised, and sharp. The epidermis is dark brownish-olive color and polished, and has, besides occasional markings of black or brown, fine rays of a lighter shade running from the beaks to the inferior margin. The lunula is not distinct.

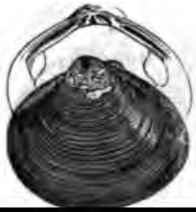
Compared with *Corbicula Primeana*, Morelet, this species is lighter in texture, more inequilateral, the posterior side is more produced, the beaks are fuller, the hinge is less robust, and the general coloring is not the same.

2. **Corbicula Primeana,** Morelet.

Cyrena (Batissa) ***Primeii,*** **Morelet (non Mörch). Rev. Zool. 480. 1862.**

C. testa transversim ovata, subæquilaterali; lateribus rotundata, solida, nitida, sulcis numerosis et tenuibus regulariter coelata; epidermide viridi lutescente, ad umbones fuscescente induta, maculisque paucis fusculis obscure notata; umbones obtusi, erosi, apice violaceo maculati, antice vix proni; ligamentum tumidum, prominens, terminale; margarita livido-violacea.

FIG. 2.



Long. 32; lat. 25; diam. 16 mill.

The specimens I possess of this species, and from which the accompanying figure was taken, were kindly sent to me by the original describer.

3. **Corbicula Mülleriana,** nov. spec.

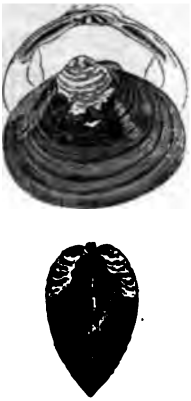
C. testa ovato-transversa, æquilaterali, solidiuscula, subinflata; latere antico rotundato, postico subobtuso; umbonibus tumidulis, obtusis, sæpius erosis; sulcis distantibus; epidermide squalide-virescente, nitente vestita; cardine incrassato; valvis intus pallide violaceo tinctis; lunula vix conspicua.

Long. 25; lat. 20; diam. 14 mill.

Hab.—In flumine Fuh Chan, Chinae. Collect. Wheatley et Prime.

The shell is rounded-oval, equilateral, not much inflated, somewhat solid, the margins are generally rounded, the posterior margin is slightly obtuse. The hinge is broad and robust, and the teeth are strong; the anterior lateral tooth is a little bent in the vicinity of the muscle. The interior of the valves is pale violet. The beaks are moderately inflated but obtuse, and they are often eroded. The lunula is indistinct. The sulci are distant, in young specimens they are very distinct, regular, much raised, and sharp, in the adult shell they seem at times to become nearly obsolete. The epidermis is polished and varies in color from light green to a dark ferruginous brown, the portion of the shell in the immediate vicinity of the beaks is most generally brown or black.

Fig. 8.

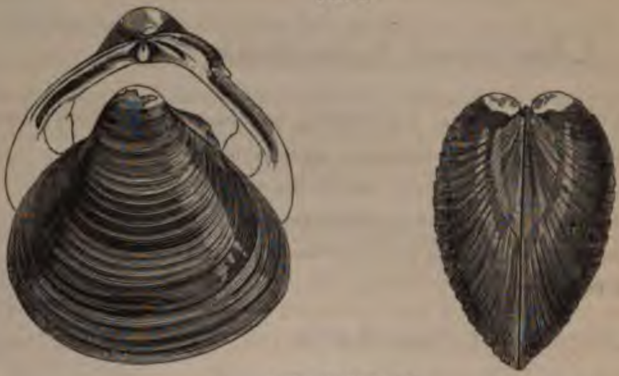


Corbicula Mülleriana.

I am at a loss to understand how this species, which is found quite commonly, should have escaped the notice of conchologists; it has probably been confounded with *Corbicula fluminea.* Compared with that species it is very much smaller, much more transverse, less triangular, less ponderous, and less solid;

the beaks are less full and less prominent; the hinge-margin is more delicate and straighter, and the color of the epidermis is lighter and not so uniform.

Fig. 4.



Corbicula fluminea.

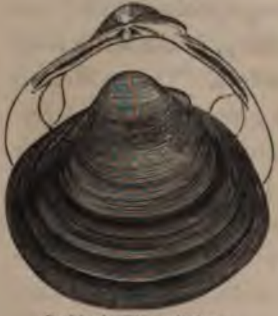
I dedicate this species to the memory of the author of the Vermium terrestrium, etc., the first who described species of this genus.

I am indebted to Mr. Wheatley for my specimens of *Corbicula Mülleriana.*

4. **Corbicula Chemnitziana,** nov. spec.

C. testa triangulari, æquilaterali, compressiuscula; latere antico rotundato, postico attenuato; umbonibus tumidulis, incurvis, approximatis, integris; cardine incrassato; valvis solidiusculis, intus pallide-violaceis, ad margines saturatioribus; lunula ovato-lanceolata; striis numerosis, ad marginem inferiorem imbricatis; epidermide luteo-virescente, subnitente vestita.

Fig. 5.



Corbicula Chemnitziana.

Long. 35; lat. 31; diam. 19 mill.

Hab.—China? Collect. Prime.

The shell is triangular, equilateral, and not much inflated. The anterior side is rounded and the posterior side is somewhat attenuated. The beaks are full, though not much raised, they curve inwardly, and are approximate. The valves are solid. The hinge is strong though not broad, and forms an obtuse angle. The interior is pale violet, which becomes more intense on the margins and the muscular impressions. The sulci are not much raised, and are regular until they reach the centre of the discs, then becoming more and more irregular as they approach the inferior margin. The epidermis is a little polished and of a soiled greenish color. The lunula is quite distinct.

Comparing this species with *Corbicula fluminea*[*] we find that it is smaller, less inflated, less solid, more transverse, the beaks are less full and not so much raised, the hinge also is narrower and not so strong; the sulci and the general coloring are different.

The only specimens of this species I have met with are those in my cabinet. I have every reason for assigning China as the place where this species is found.

5. **Corbicula lutea,** Morelet.

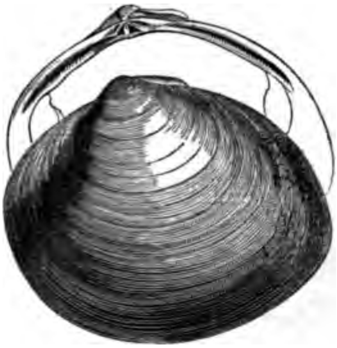
Cubicula *lutea,* Morelet. Rev. Zool. 481. 1862.

C. testa ovato-subtrigona, transversa, inæquilaterali, tumidula, tenui; latere antico rotundato, postico attenuato; ligamento modico; umbonibus parvulis, acutiusculis, incurvis, violaceis; sulcis fere obsoletis; cardine angustissimo; dentibus minutis, tenuibus; epidermide flaveo-lutescente maculisque cinereis plus minusve notata, ad margines nitente, vestita; margarita albido-lilacina.

Long. 43; lat. 35; diam. 22 mill.

Hab.—China. Collect. Morelet et Prime.

FIG. 6.



Corbicula lutea.

The shell is transverse, oval-subtrigonal, inequilateral, delicate, and somewhat inflated. The anterior side is rounded and the posterior somewhat attenuated. The beaks are small, acute, they curve inwardly and are approximate. The hinge is very slightly curved, narrow and delicate; the cardinal teeth are very small, the lateral teeth are long, narrow, and slight. The interior is whitish-lilac with a tinge of light pale brown on the basal margin. The sulci are very nearly obsolete; they become more distinct, however, and less regular as they approach the inferior portion of the shell. The epidermis is of a soiled yellowish color, violet upon the beaks and with occasional spots of grey, and somewhat polished on the margins.

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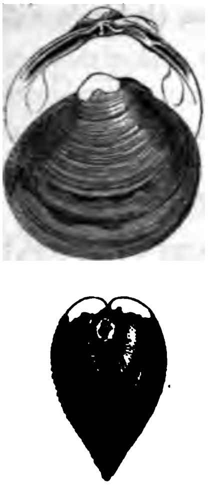
[*] See Fig. 4, page 60.

This species is different from all others of the genus; its outline is more like that of a Batissa or Cyrena, and it comes very near a species of Cyrena from the Basin of Paris, the *Cyrena compressa.* The texture of the valves is remarkably delicate proportionately to their size.

Monsieur Morelet, to whose kindness I am indebted for my specimens of *Corbicula lutea,* observes that this species is found very abundantly, and that it is used by the natives as an article of food.

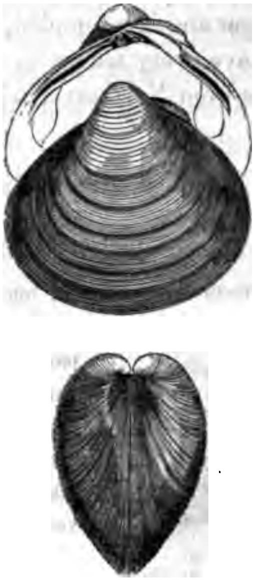
a violet under surface. The valves are moderately solid, they are curved in the centre but very much flattened on the inferior margin and its immediate vicinity. The interior is violet. The hinge is moderately broad and strong, and is curved. The striæ are more or less regular, they are not much raised. The epidermis is somewhat polished and is of a dusky greenish color.

Fig. 7.



Corbicula difficilis.

Fig. 8.



Corbicula cor.

A peculiarity of this species is the remarkable appearance presented by the inferior portion of the valves, the lower margin of the shell, starting from the inferior extremities of the lateral teeth, is so much flattened as to induce one to suppose that the compression was due to artificial means; this can, however, hardly be the case, as a number of specimens which I have had under examination showed exactly the same characters. The *Corbicula difficilis* has probably been confounded with *Corbicula cor*, and looked upon as an abnormal variety of that species. On comparison, however, we find that the species differ not only in respect to the flattening of the inferior margins in *Corbicula difficilis*, but that the *Corbicula cor* is larger, more transverse, less inequilateral, more inflated and more robust; the beaks are fuller, larger, and more prominent; the hinge is stronger and less rounded, and the striæ are deeper.

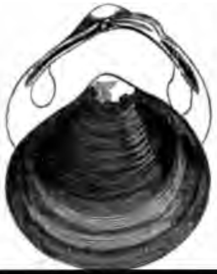
I have every reason to suppose that the *Corbicula difficilis* comes from Northern Africa.

7. **Corbicula leviuscula,** nov. spec.

Corbicula *leviuscula,* Prime in litt. Cat. 4. 1868.

C. testa ovato-trigona, inæquilaterali; latere antico producto, rotundato, postico subtruncato; subinflata; umbonibus parvulis, depressis, apice denudato, albidis; margarita albido-lilacina; cardine angusto; dentibus minutis; lunula inconspicua; sulcis regularibus, tenuibus; epidermide nitidissima, fuscescente, ad marginem inferiorem pallide viridi-flavescente vestita.

Fig. 9.



Long. 27; lat. 26; diam. 17 mill.

respects, however, it is quite different. The *Corbicula leviuscula*, though larger, is much lighter and more delicate than *Corbicula difficilis;* it is somewhat more inflated, less transverse, the beaks are less curved, the hinge is much narrower and less strong, the sulci are closer and more regular, the epidermis is different in color and more polished, the color of the interior is not the same, and finally the inferior margins do not present the abnormal appearance peculiar to those of *Corbicula difficilis.*

8. **Corbicula Malaccana,** Deshayes.

Corbicula *Malaccensis*, Desh. Proc. Zool. XXII., 343. 1854. Biv. Brit. Mus. 229. 1854.

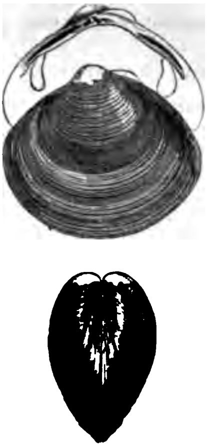
C. testa ovato-transversa, subtrigona, inæquilaterali, turgidula, solidula; umbonibus parvulis, obtusis; latere antico longiore; extremitatibus obtusis; valvis intus albidis vel pallide violaceo tinctis; cardine angusto; epidermide subnitente, viridi-flavescente vestita; sulcis regularibus.

Long. 27; lat. 23; diam. 15 mill.

Hab.—In rivulis ad Malaccam affluentibus. Collect. Cuming et Prime.

The shell is rounded-oval, inequilateral, and not inflated. The sides are obtuse. The beaks are small and not much raised. The interior is white or pale violet. The sulci are light and regular. The epidermis is greenish-yellow and somewhat polished. The hinge is somewhat narrow.

Fig. 10.



Corbicula Malaccana.

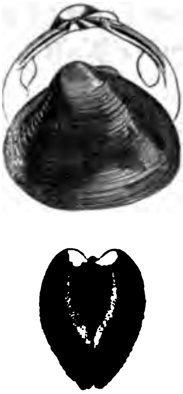
Compared with *Corbicula cor*, the *Corbicula Malaccana* is smaller, less solid, less inflated and less transverse; the beaks are less tumid and the sulci are lighter.

9. **Corbicula rhomboidea,** Prime.

Corbicula *rhomboidea*, Prime. Acad. N. S. Phil. Proc. 127. 1861. Prime Cat. 3. 1863.

C. testa ovato-transversa, subæquilaterali, tumidula, solidiuscula; utraque extremitate obtusa; regulariter sulcata; epidermide nitente, fuscescente vestita; umbonibus tumidulis, magnis, obliquis, profunde erosis; margarita albido-lilacina; cardine incrassato; lunula ovato-lanceolata.

Fig. 11.



Corbicula rhomboidea.

Long. 23; lat. 19; diam. 14 mill.

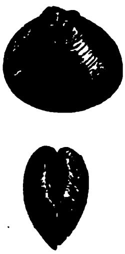
Hab.—Malacca. Collect. Cuming et Prime.

The shell is solid, subequilateral, and inflated. The sides are obtuse. The beaks are large, inflated, and oblique. The lunula is quite distinct. The sulci are raised, thick, and regular. The epidermis is brown and polished. The interior is whitish-lilac, somewhat darker on the margins. The hinge is broad and strong. The cardinal teeth are large, broad, flattened, and very strong.

The shell is small, orbicular-trigonal and somewhat inflated. The posterior side is obtuse. The beaks are small, and they curve inwardly. The striæ are close and regular. The lunula is distinct and oval. The interior of the valves is pale violet. The hinge is narrow. The epidermis is yellowish and polished.

Compared with *Corb. radiata*, this species is less globose, not so inflated, the beaks are not so tumid, the striæ are closer, and the color of the epidermis is different.

FIG. 12.



Corb. Kirkii.

This interesting species was brought from Africa by John Kirk, M.D., of Edinburgh, to whom I take great pleasure in dedicating it. Dr. Kirk accompanied the Zambesi Expedition sent out by the British Government, in the capacity of medical officer and naturalist. I am indebted to Mr. Isaac Lea for being able to describe this species.

11. **Corbicula brunnea,** Prime.

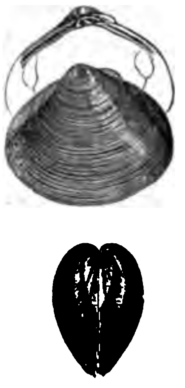
Corbicula *brunnea*, Prime. Acad. N. S. Phil. Proc. 126. 1861. Prime Cat. 3. 1863.

C. testa ovato-transversa, æquilaterali, solidiuscula, subinflata; latere antico rotundato, postico obtuso; regulariter striata; epidermide nitente, fuscescente vestita; umbonibus parvulis, integris, apiculatis, incurvis, violaceo radiatis; margarita violacea; cardine incrassato; lunula ovato-lanceolata.

Long. 22; lat. 19; diam. 12 mill.

Hab.—In flumine Scamander insulae Tasmaniae. Collect. Prime.

FIG. 13.



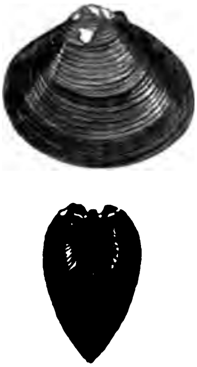
Corbicula brunnea.

The shell is equilateral and not much inflated; the anterior margin is rounded and the posterior margin is obtuse. The beaks are small, apiculated, they curve inwardly and are radiated with violet. The interior of the valves is violet. The lunula is distinct. The sulci are regular. The epidermis is brown and polished. The hinge is rounded and not very broad.

12. **Corbicula Leana,** nov. spec.

C. testa ovato-transversa, æquilaterali, compressiuscula; utroque latere æqualiter declivi, latere antico rotundato, postico subtruncato; margine inferiore arcuato; umbonibus tumidulis; margarita violacea; regulariter striata; epidermide pallide viridescente, nitente vestita; cardine incrassato; dentibus crassis; lunula ovato-lanceolata, pallida.

Fig. 14.



Corbicula Leana.

Long. 26; lat. 22; diam. 14 mill.

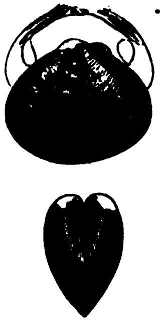
Hab.—Japonia. (fide Wilson.) Col. Lea et Prime.

The shell is equilateral and somewhat compressed. The beaks are tumid. The color of the interior is violet. The lunula is pallid. The sulci are regular. The epidermis is polished and of a pale greenish color. The hinge is strong.

Compared with *Corb. Primeana*, it is smaller, more equila-

The shell is transversely oval, subtrigonal, nearly equilateral, not very solid and somewhat compressed. The anterior margin is rounded and the posterior one somewhat obtuse. The beaks are full, but not raised, they are very generally eroded. The striæ are nearly obsolete, and when visible, irregular and somewhat distant. The epidermis is very highly polished and varies from greenish-brown to blackish-brown, or even black; it is lighter in the young specimens. The lunula is very indistinct. The hinge is rounded and somewhat strong. The interior of the shell is pale violet.

FIG. 15.



Corb. Japonica.

This is an attractive species, and is quite remarkable for the high polish of the epidermis.

We are indebted for the discovery of the *Corb. Japonica* to Mr. Gulick, who seems to have found it in great abundance.

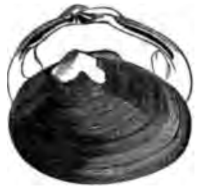
14. **Corbicula Lamarckiana**, nov. spec.

C. testa ovato-transversa, valde inæquilaterali, compressa; latere antico rotundato, postico longiore, subobtuso; umbonibus parvulis, depressis; cardine lato, incrassato; margarita lilacina; regulariter et densè striata; epidermide fuscescente vestita; ligamento elongato; lunula nulla.

Long. 24; lat. 18; diam. 10 mill.

Hab.—Montes Laos, Cambodiae. Col. Prime.

FIG. 16.



Corbicula Lamarckiana.

The shell is transversely-oval, very inequilateral, the posterior side being much the longer, and it is quite compressed. The beaks are small and obtuse. The ligament is elongated. The striæ are regular and very close, they are not raised, though perfectly distinct, and becoming somewhat obsolete as they approach the inferior margin. The epidermis is light brown and has no polish. The valves are sometimes slight, and when held to the light are perfectly transparent. The hinge is broad and strong. The cardinal teeth are robust and compressed. The lateral teeth are broad and comparatively short. The lunula is wanting. The interior is lilac and quite brilliant.

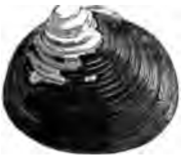
The outline of this species recalls somewhat that of the *Corbicula prolongata*, from Australia ; it differs otherwise, however, in not having the same texture and in being more compressed.

I am indebted to the kindness of Mr. Wheatley for this, as also for the two following species.

15. **Corbicula Linneana,** nov. spec.

C. testa ovato-subtrigona, transversa, inæquilaterali, solidiuscula, compressiuscula ; lateribus obtusis ; umbonibus parvulis, obtusis ; cardine incrassato ; valvis intus violaccis, ad margines saturatioribus ; irregulariter et densè striata ; epidermide fuscescente vestita ; lunula nulla.

Fig. 17.

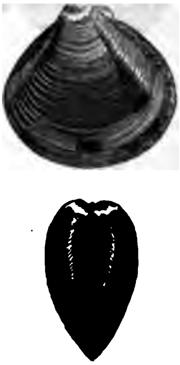


Long. 23 ; lat. 20 ; diam. 13 mill.

Hab.—Montes Laos, Cambodiae. Col. Prime.

16. **Corbicula Blandiana,** nov. spec.

FIG. 18.



Corbicula Blandiana.

C. testa rotundato-trigona, æquilaterali, solida, compressiuscula; umbonibus parvulis, tumidulis, incurvis; latere antico rotundato, postico breviore, subobtuso; margarita violacea; cardine incrassato, arcuato; dentibus lateralibus prælongis; striis regularibus, remotis; epidermide nitente, viridi fuscescente vestita; lunula ovato-lanceolata.

Long. 23; lat. 22; diam. 13 mill.

Hab.—Montes Laos, Cambodiae. Col. Prime.

The shell is rounded, trigonal, equilateral, solid, somewhat compressed. The anterior margin is rounded and the posterior somewhat obtuse and shorter. The beaks are small, slightly inflated, and they curve inwardly. The interior is violet. The hinge is rounded and strong, the lateral teeth are considerably elongated. The striæ are regular, somewhat distant, raised and sharp. The epidermis is of a soiled greenish-brown color and polished. The lunula is quite distinct.

Somewhat allied to *Corbicula Malaccana*, it is however more trigonal, less transverse, less inflated, the hinge is more curved, the interior is darker, the striæ are more regular, and the color of the epidermis is not the same. It is smaller and more equilateral than either *Corbicula difficilis* or *Corbicula leviuscula*, and it is more trigonal, smaller, and less inflated than *Corbicula cor.*

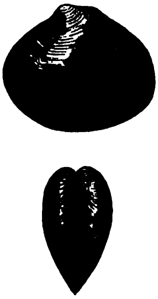
I take much pleasure in dedicating this species to Mr. Th's Bland.

17. **Corbicula Sayana,** nov. spec.

C. testa ovato-transversa, subtrigona, compressa, subæquilaterali; latere antico rotundato, postico longiore, obtuso; umbonibus parvulis, brevibus; margarita atro-violacea, ad margines nitidissima; cardine

angusto; striis regularibus; epidermide viridescente, nitente vestita; lunula nulla.

Fig. 19.



Corbicula Sayana.

Long. 20; lat. 16; diam. 10 mill.

Hab.—Insulae Philippinenses. Collect. Wheatley et Prime.

The shell is somewhat slight, transversely oval, subtrigonal, compressed, and nearly equilateral. The anterior side is rounded and the posterior is longer and obtuse. The beaks are small and not much raised. The interior is blackish-violet and very highly polished on the margins. The hinge is narrow, rounded, and rather delicate. The striæ are very regular. The epidermis is greenish and polished. The lunula is wanting.

Very closely allied to *Corbicula Manillensis*, it is however less equilateral, less inflated, transversely less rounded, the posterior side is more produced, the beaks are less full, and the striæ are closer. Compared with *Corbicula striatella*, from India, it is a little slighter, more elongated, and not so oval.

18. **Corbicula Crosseana**, nov. spec.

violet under-surface. The interior is violet. The hinge is strong and rounded. The striæ are raised, very regular, but not very close. The epidermis is somewhat polished and of a pale greenish-brown color.

In shape and in inflation this species comes near the type form of *Corbicula Cumingii;* the beaks are, however, more obtuse, the hinge is broader and stronger, the striæ are closer, more regular and more raised, and the coloring is different.

It gives me much pleasure to dedicate this species to the able editor of the Journal de Conchyliologie.

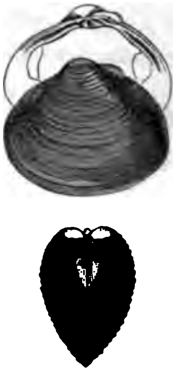
19. **Corbicula venustula,** nov. spec.

C. testa ovato-transversa, æquilaterali, solidiuscula, inflata; latere antico rotundato, postico angustiore, obtuso; umbonibus parvulis; cardine incrassato, rotundato; valvis intus pallide violaceis; sulcis tumidis, regularibus; epidermide nitidissima, viridi-flavescente vestita; lunula ovato-lanceolata, flava.

Long. 22; lat. 18; diam. 12 mill.

Hab.—Manilla. Collect. Wheatley et Prime.

FIG. 21.



Corbicula venustula.

The shell is transversely-oval, solid, inflated, and equilateral. The anterior side is rounded, the posterior side is somewhat narrower and is obtuse. The hinge is strong and rounded. The beaks are small. The lateral teeth are somewhat short. The interior is highly polished and violet, but very variable in shade, the teeth and the extreme edge of the margins being very much lighter. The striæ are regular and prominent. The epidermis is greenish-yellow and polished. The lunula is yellow and very distinct.

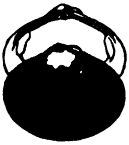
This species recalls at first sight the *Corbicula gracilis* from Java, but on examination it is found to be very different. The *Corbicula venustula* is much less spherical and more trans-

verse, the teeth are less robust and the interior coloring not the same. In fact it is more closely allied to *Corbicula Crosseana* than to any other species. It differs, however, in being smaller, more solid, more equilateral, and more transverse; the posterior side is less protruded, the coloring of the interior is not the same, the epidermis is more highly polished, and the lunula is more distinct.

20. **Corbicula striatella,** Deshayes.

Corbicula *striatella*, Deshayes. Proc. Zool. XXII. 344. 1854.
Biv. Brit. Mus. 224. 1854.
Prime Cat. 3. 1863.
Corbicula *violacea*, Prime. Acad. N. S. Phil. Proc. 128. 1861.
Prime Cat. 3. 1863.

Fig. 22.



Corb. striatella.

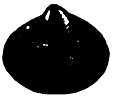
C. testa ovato-transversa, depressiuscula, æquilaterali; extremitatibus æqualiter obtusis; transversim regulariter striata; epidermide pallide viridescente, nitente vestita; pagina interna violacea; umbonibus brevibus, atro-violacentibus, pallidiore biradiatis; cardine angusto; lunula ovato-lanceolata, pallide flavescente.

21. **Corbicula subradiata,** Prime.

Cyrena *subradiata,* Kurr in litt.
Corbicula *subradiata,* Prime. Acad. N. S. Phil. Proc. 127. 1861.
Prime Cat. 3. 1863.

C. testa ovato-trigona, transversa, æquilaterali, compressiuscula, extremitatibus obtusis; striis regularibus; epidermide viridi, nitente induta; margarita pallide violacea; umbonibus minimis, acutiusculis, inclinatis, violaceo subradiatis; cardine angusto; lunula ovato-lanceolata.

Fig. 23.



C. subradiata.

Long. 14; lat. 12; diam. 7 mill.

Hab.—Agra, Indiae. Collect. Prime.

The shell is small, transversely-oval, trigonal, equilateral, and somewhat compressed. The lateral margins are obtuse. The striæ are very regular. The epidermis is green and polished. The lunula is indistinct and pale. The beaks are very small and acute, they curve inwardly, are flesh-colored and marked with a ray of dark violet. The interior of the valves is violet.

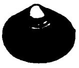
The *Corbicula subradiata* is very closely allied to *Corbicula radiata* of Africa; it is, however, more trigonal, less globose, and the beaks are less tumid and less acute.

22. **Corbicula Agrensis,** Prime.

Cyrene *Agrensis,* Kurr in litt.
Corbicula *Agrensis,* Prime. Acad. N. S. Phil. Proc. 128. 1861.
Prime Cat. 3. 1863.

C. testa parvula, ovato-transversa, subæquilaterali, subinflata; extremitatibus rotundatis; epidermide viridi-olivacea induta; sulcis regularibus; margarita violacea; umbonibus parvulis, acutiusculis; cardine angusto; lunula pallida.

Fig. 24.



C. Agrensis.

Long. 9; lat. 8; diam. 5 mill.

Hab.—Agra, Indiae. Collect. Prime.

The shell is small, transversely oval, nearly equilateral, and slightly inflated. The lateral margins are obtuse. The beaks are small, acute, and they curve inwardly. The interior is violet. The striæ are regular. The epidermis is greenish-olive. The lunula is quite distinct and of a paler color than the rest of the shell.

Compared with *Corbicula Quilonensis*, this species is more equilateral and the posterior side is less produced; the beaks are also less inflated and more approximate. It is less inflated and has closer striæ than *Corbicula tumida*.

23. **Corbicula parvula,** Prime.

Corbicula *parvula*, Prime. Acad. N. S. Phil. 127. 1861.
Prime Cat. 4. 1863.

C. testa ovato-transversa, compressiuscula, æquilaterali; extremitatibus obtusis; umbonibus parvulis, acutiusculis, incurvis, brevibus; sulcis irregularibus, obsoletis; epidermide pallide viridi-flavescente, nitente vestita; margarita pallide violacea; cardine

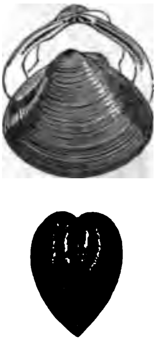
Fig. 25.

less drawn up to an angle. The striæ are also different, being more obsolete and less regular. The color of the epidermis is not the same.

24. **Corbicula purpurea,** nov. spec.

Corbicula *purpurea*, Prime in litt. Cat. 4. 1863.

Fig. 26.



Corbicula purpurea.

C. testa ovato-transversa, subtrigona, inflata, æquilaterali; extremitatibus obtusis; umbonibus parvulis, tumidulis, incurvis, approximatis, violaceo maculatis; regulariter sulcata; epidermide viridi, nitente vestita; cardine incrassato; margarita profunde violacea; lunula ovato-lanceolata.

Long. 20; lat. 16; diam. 12 mill.

Hab.—In flumine Tigris, Asiae. Collect. Wheatley et Prime.

The shell is transversely-oval, somewhat trigonal, inflated, and equilateral. The lateral margins are obtuse. The beaks are small, tumid, approximate, they curve inwardly and are marked with violet. The epidermis is green and polished. The striæ are regular. The interior is a rich and brilliant violet or purple. The lunula is very distinct, and of a lighter shade than the rest of the shell. The hinge is rounded and somewhat broad.

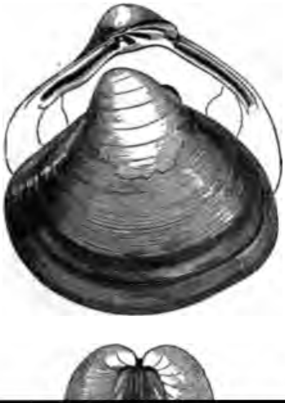
The *Corbicula violacea* is allied to certain forms of *Corbicula cor*, and more especially to those of the young of this species; it is, however, smaller, more equilateral, much more transverse, not so trigonal, the beaks are less full and less raised, and the hinge is less curved, less broad, and less robust. In coloring and in disposition of the striæ, the two species are very similar.

25. **Corbicula Largillierti,** Deshayes.

Cyrena *Largillierti,* Philippi. Zeit. Malak. 163. 1844. Phil. Abbild. II. 75, pl. 1, f. 1. 1844.
Corbicula *Largillierti,* Deshayes. Biv. Brit. Mus. 225. 1854. Prime Cat. 3. 1863.

C. testa trigona, subæquilaterali, compressiuscula, epidermide olivacea induta; latere antico lato, rotundato, postico angustiore, acuminato, obtuso; umbonibus tumidis, elevatis, antice inclinatis, incurvis, approximatis; lunula indistincta; dense et irregulariter striata; epidermide olivacea induta; pagina interna albida, ad margines violacea; cardine incrassato.

FIG. 27.



Long. 36; lat. 33; diam. 20 mill.

Hab.—In flumine Yang-tse-Kiang, Chinae. Collect. Wheatley, Jay, et Prime.

The *Corbicula Largillierti* is rare. The specimens in my cabinet, which served for the above description and figure, came from Monsieur Largilliert, from whose collection Philippi described the original *Cyrena Largillierti.*

26. **Corbicula sulcatina,** Deshayes.

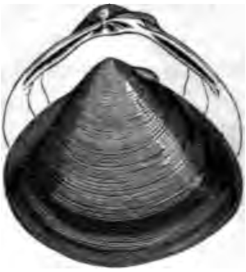
Corbicula *sulcatina,* Deshayes. Proc. Zool. XXII., 348. 1854.
Biv. Brit. Mus. 233. 1854.

C. testa transversa, ovato-trigona, turgidula, subæquilaterali, obliqua, transversim dense et tenue sulcata, sulcis postice evanescentibus; lunula depressa, lævigata; epidermide viridi-flavescente vestita; umbonibus lævigatis, prominentibus, obliquis, incurvis; margarita candida, ad margines pallide castanea vel violacea; cardine angusto.

Long. 33; lat. 29; diam. 17 mill.

Hab.—China. Collect. Cuming et Prime.

FIG. 23.



Corbicula sulcatina.

The shell is transversely oval, trigonal, not much inflated, and nearly equilateral. The posterior is slightly produced and is obtuse at the extremity. The beaks are moderately full, raised, approximate, and they curve inwardly. The interior is white, with chestnut or violet on the margins and teeth. The epidermis is yellowish-green, with occasional spots of a darker color. The hinge is curved and somewhat narrow.

The specimens which served for the above description and drawing were received from Mr. Cuming, from whose cabinet Monsieur Deshayes described the *Corbicula sulcatina.* No locality is assigned to this species, but its form and general appearance place it beyond a doubt with the Corbiculæ from China.

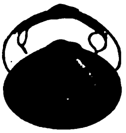
In my Catalogue I had classed this species under the head of *Corbicula Largillierti;* since its publication having had an opportunity of forming a complete suite of the *Corbicula sulcatina*, I found cause to change my views, and I now consider it as a distinct species. Compared with *Corbicula Largillierti*, it is more transverse, less trigonal, the beaks are much less inflated and less raised, the anterior margin is not so broad, the hinge is slighter, narrower, less abruptly curved, and not so strong, and the coloring of the shell is different.

27. **Corbicula minor,** Prime.

Corbicula *minor*, Prime. Acad. N. S. Phil. Proc. 127. 1861.
Prime Cat. 4. 1863.

C. testa parvula, ovato-transversa, compressiuscula, solidiuscula, subæquilaterali; extremitatibus rotundatis; umbonibus prominentibus; sulcis regularibus; epidermide virescente vestita; pagina interna violacea; cardine angusto; lunula indistincta.

Fig. 29.



Corb. minor.

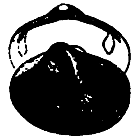
Long. 15; lat. 11; diam. 8 mill.

Hab.—Nova Hollandia. Collect. Prime.

The shell is small, transversely rounded, somewhat com-

extremitatibus rotundatis; umbonibus brevibus, prominentibus, acutiusculis, approximatis, incurvis, antice inclinatis, violaceo subradiatis; sulcis regularibus; margarita pallide violacea; epidermide pallide virescente, nitente induta; cardine angusto; dentibus lateralibus inæqualibus; lunula ovato-lanceolata, flava.

FIG. 80.



Corb. inæquilateralis.

Long. 16; lat. 12; diam. 7 mill.

Hab.—Africa. Collect. Prime.

The shell is transversely oval, somewhat compressed, and very inequilateral. The lateral margins are rounded. The beaks are small, raised, acute, they curve inwardly, they are approximate and very much inclined. The valves are slight. The interior is pale violet. The striæ are regular. The epidermis is pale greenish with violet markings on the beaks, and is polished. The hinge is quite narrow and nearly straight. The posterior lateral tooth is longer than the posterior tooth. The lunula is oval and yellow.

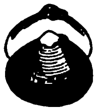
The very inequilateral appearance of this species renders it quite distinct.

29. **Corbicula solidula,** Prime.

Corbicula *solidula*, Prime. Acad. N. S. Phil. Proc. 127. 1861.
Prime Cat. 4. 1863.

C. testa parvula, ovato-trigona, crassula, subæquilaterali, tumidula; striis regularibus; extremitatibus rotundatis; epidermide flavescente, nitente induta; valvis solidiusculis; margarita albida, ad impressiones musculares castanea; cardine incrassato; lunula inconspicua.

FIG. 81.



C. solidula.

Long. 11; lat. 10; diam. 7 mill.

Hab. ? Collect. Prime.

The shell is small, oval, trigonal, somewhat equilateral, and more or less inflated. The sides are rounded. The beaks are moderately inflated and not prominent. The striæ are regular but somewhat coarse. The epidermis is yellow. The lunula is not very distinct. The valves are comparatively solid and heavy. The interior is white, with chestnut markings on the muscular impressions. The hinge is broad and curved. The teeth are strong and broad.

Comparing this species with *Corbicula trigona*, we find that it is more trigonal, less transverse, more solid, the posterior side is less produced, the beaks are not so acute, the striæ are coarser, and the coloring is different.

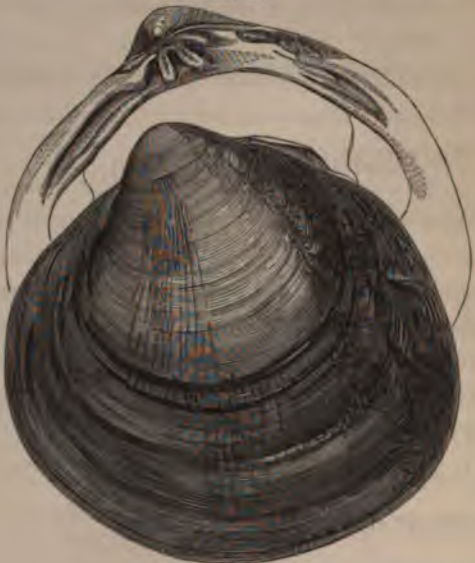
Genus BATISSA.

1. **Batissa solidula,** Prime.

Batissa *solidula*, Prime. Proc. Zool. 1862.—Prime Cat. 5. 1863.

B. testa ovato-orbiculari, subæquilaterali, compressiuscula; latere antico productiore, rotundato, postico abrupto, obtuso; valvis solidis, intus albidis, ad margines violaceis; cardine incrassato, dentibus cardi-

Fig. 82.



Batissa solidula.

nalibus subæqualibus; lateralibus angustis inæqualibus, postico remoto; epidermide nigro-virescente, nitida vestita; area posticali rugis irregularibus divaricatis corrugata; umbonibus parvulis, integris, antice inclinatis, incurvis.

Long. 60; lat. 60; diam. 33 mill.

Hab. ? Collect. Cuming et Prime.

The shell is rounded, orbicular, subequilateral, and not much inflated. The anterior side is somewhat produced and rounded, the posterior side is broader and very abrupt. The valves are solid. The color of the interior is white, running into violet on the inferior posterior side and on the margins. The margins are much flattened. The hinge is broad and very much curved. The cardinal teeth are slightly divergent and subequal. The lateral teeth are moderately elongated, somewhat narrow and unequal; the posterior lateral tooth is situated at a considerable distance from the primaries, and is somewhat rudimentary. The epidermis is dark or blackish green and polished. The folds on the posterior side are coarse and irregular. The beaks are small, not denuded, inclined; they curve inwardly and are approximate.

This species is very closely allied to *Batissa Jayana* from Java; it is, however, more solid, somewhat more inflated, the hinge is much broader, the cardinal teeth are longer and less divergent, the lateral teeth are broader, and the posterior lateral tooth is more rudimentary and less elongated.

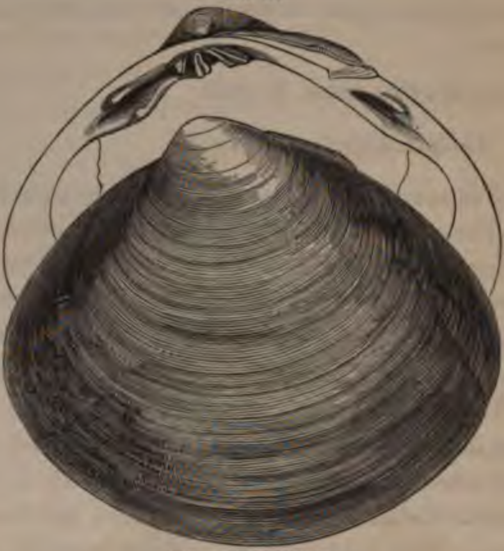
Genus CYRENA.

1. **Cyrena Bernardiiana,** Prime.

Cyrena *Bernardiiana,* Prime. Acad. N. S. Phil. Proc. 126. 1861.
Prime Cat. 6. 1863.

C. testa ovato-transversa, subtrigona, subæquilaterali, tumida, in medio ventricosa; margine superiore arcuato; valvis solidis, intus candidissimis; cardine angusto, dentibus cardinalibus angustis, majoribus apice profunde fissis, dente laterali antico conico; ligamento elongato, partim in fosso; umbonibus inclinatis, parvulis; sulcis obsoletis; epidermide viridi, nitente vestita.

Fig. 33.



Cyrena Bernardiana.

Long. 65; lat. 57; diam. 38 mill.

Hab.—Nova Caledonia. Collect. Prime.

The shell is transversely-oval, subtrigonal, nearly equilateral, and inflated, more especially so in the centre of the discs. The posterior margin is somewhat abrupt at the extremity. The other margins are rounded. The valves are solid. The interior is white. The hinge is somewhat narrow. The cardinal teeth are rather slight and divergent, and the principal ones are bifid. The anterior lateral tooth is conical, the posterior lateral tooth is narrow, somewhat elongated and compressed. The beaks are small. The epidermis is bright green and polished. The striæ are more or less obsolete. The folds on the posterior side are coarse and irregular.

This species is dedicated to the late Chevalier Bernardi, who was formerly one of the editors of thé Journal de Conchyliologie.

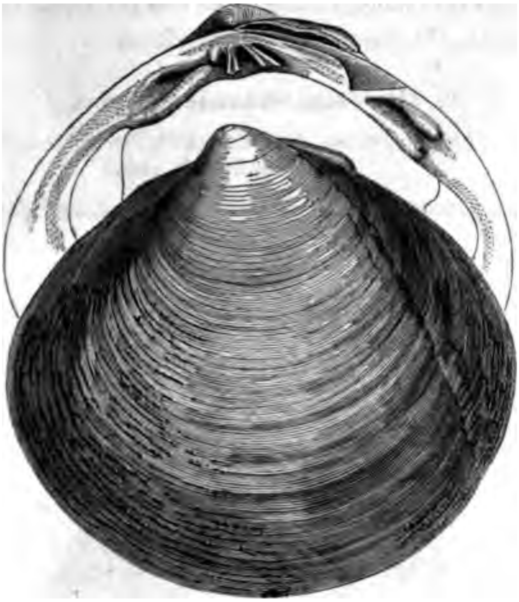
The *Cyrena Bernardiiana* is more inflated and more transverse than *Cyrena nitida.* Compared with *Cyrena Ceylonica* it is not so solid, more inflated, and less trigonal.

2. **Cyrena proxima,** nov. spec.

Cyrena *proxima,* Prime in Litt. Cat. 6. 1863.

C. testa ovato-suborbiculari, subæquilaterali, subinflata; latere antico rotundato, postico subobtuso; pagina interna candidissima; cardine crasso, lato; dentibus cardinalibus angustis, divergentibus, majoribus bifidis; umbonibus parvulis, integris, inclinatis, incurvis, approximatis; striis obsoletis; epidermide viridi, nitente induta.

Fig. 34.



Cyrena proxima.

Long. 67; lat. 63; diam. 37 mill.

Hab.—Siam. Collect. Prime.

The shell is oval-suborbicular, nearly equilateral, and somewhat inflated. The anterior side is rounded, the posterior is subobtuse. The beaks are small, they curve inwardly and are approximate. The valves are solid. The interior is white. The hinge is broad. The cardinal teeth are narrow and divergent, the two principal ones are bifid. The anterior lateral tooth is conical and the posterior one somewhat elongated and flattened. The striæ are more or less obsolete. The epidermis is light green and polished. The ligament is narrow, elongated, and not prominent.

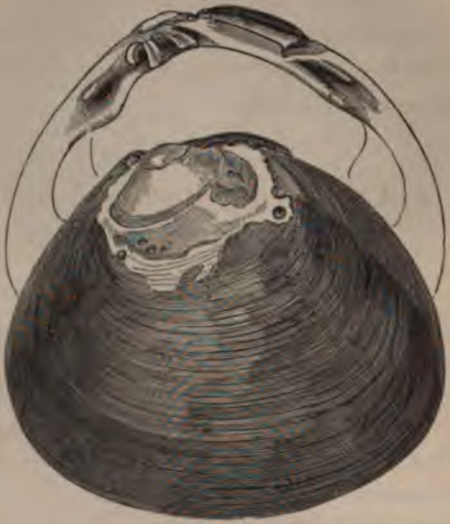
This species is less inflated and less orbicular than *Cyrena sphærica*, and it is more inflated and less produced than either *Cyrena nitida*, *Papuana*, or *Bernardiiana*.

3. **Cyrena Siamica,** Prime.

Cyrena *Siamica*, Prime. Acad. N. S. Phil. Proc. 126. 1861.
Prime Cat. 6. 1863.

C. testa ovato-transversa, subtrigona, inæquilaterali, subinflata; postice subtruncata, antice valde declivi, in medio convexa; epidermide fusca

FIG. 35.



Cyrena Siamica.

vestita; irregulariter striata; valvis solidis, intus albis; umbonibus depressis, brevibus, sæpius erosis; cardine incrassato; dentibus cardinalibus brevibus, obliquis, fere parallelis, majoribus superne canaliculatis; lateralibus parvulis, compressis.

Long. 59; lat. 51; diam. 30 mill.

Hab.—Siam. Collect. Cuming et Prime.

The shell is transversely rounded, subtrigonal, inequilateral, and somewhat inflated. The lateral margins are more or less abrupt, and more especially the posterior margin. The valves are solid, and they are convex in the centre of the discs. The epidermis is dark brown without polish. The striæ are coarse and irregular. The beaks are small and compressed, and are frequently very much eroded. The interior is white. The hinge is curved and not very broad; the cardinal teeth are short, subparallel, the two principal ones are bifid; the lateral teeth are nearly of the same length, they are short and not much raised.

Very closely allied to *Cyrena Sumatrica*, it is however less inflated, less transverse, and the hinge is much more curved. Compared with *Cyrena ponderosa*, it is less transverse and less produced on the anterior side.

4. **Cyrena ponderosa,** Prime.

Cyrena *ponderosa*, Prime. Acad. N. S. Phil. 80. 1860.
Prime Cat. 6. 1863.

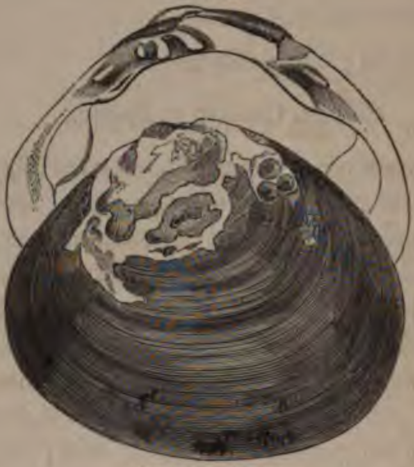
C. testa transversa, subtrigona, inæquilaterali, subinflata; latere antico producto, postico subtruncato; valvis solidis, intus candidis; umbonibus brevibus, obliquis, sæpius erosis; irregulariter et dense striata; epidermide brunnea induta; cardine incrassato; dentibus compressis, cardinalibus fere parallelis.

Long. 53; lat. 45; diam. 32 mill.

Hab.—Insulae Philippinenses. Collect. Acad. Phil. et Prime.

The shell is transverse, subtrigonal, inequilateral, and somewhat inflated. The anterior side is produced and the posterior side is somewhat truncated. The valves are very ponderous. The interior is white. The beaks are small and oblique, they are often very much eroded. The striæ are close, coarse, and indistinct. The epidermis is dusky brown without polish. The hinge is angular, broad and strong. The cardinal teeth are somewhat flattened and nearly parallel. The lateral teeth are not much raised, the anterior tooth is short and conical, the posterior is a little longer and not quite so much raised.

FIG. 86.



Cyrena ponderosa.

This species is somewhat allied to *Cyrena Bengalica*, it is however smaller, a little more transverse, and the beaks are much less raised and less inflated.

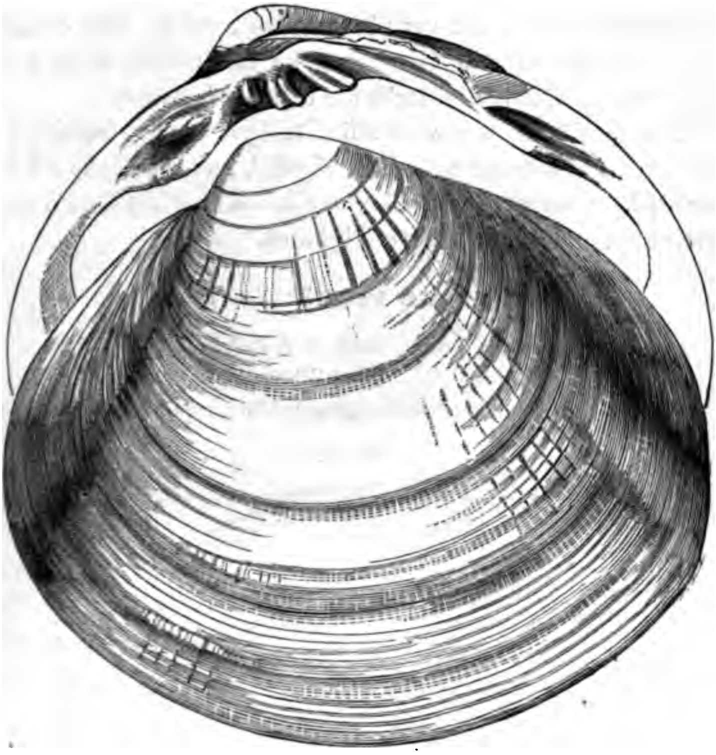
5. **Cyrena Cyprinæformis,** Prime.

Cyrena *Cyprinæformis*, Prime. Acad. N. S. Phil. Proc. 125. 1861.
Prime Cat. 6. 1863.

C. testa magna, transversa, ovato-subtrigona, suborbiculari, inæquilaterali, in medio ventricosa, solida, crassa; latere antico breviore, rotundato, postico angustiore, subtruncato; pagina interna candidissima;

umbonibus tumidis, parvis, acutis, obliquis, incurvis, approximatis; ligamento elongato, partim in fosso; epidermide viridi-fuscescente vestita;

FIG. 87.



Cyrena cyprinæformis.

cardine incrassato; dentibus cardinalibus elongatis, majoribus apice profunde furcatis, lateralibus brevibus.

Long. 94; lat. 85; diam. 58 mill.

Hab.—Australia Septentrionalis. Collect. Cuming et Prime.

The shell is large, solid, transverse, oval-subtrigonal, suborbicular, inequilateral, and ventricose in the centre of the discs. The anterior side is short and rounded, the posterior side is narrower and subtruncated. The beaks are inflated, but small, acute and oblique; they curve inwardly and are approximate.

The ligament is long and narrow and somewhat concealed. The striæ are coarse and indistinct. The epidermis is brownish green, without polish. The interior is white. The hinge is somewhat curved, not very broad, but strong. The cardinal teeth are narrow and divergent, the two principal teeth are bifurcated. The lateral teeth are short and obtuse.

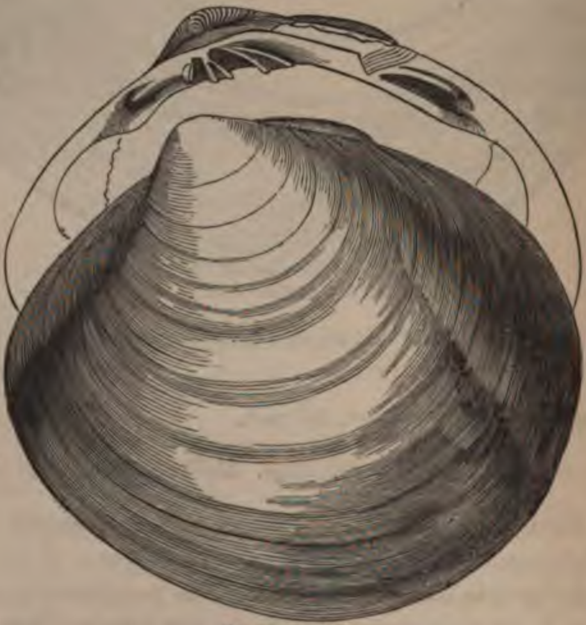
This species is somewhat allied to *Cyrena Cyprinoides*, it is however more transverse, less trigonal, and the beaks are less inflated. Compared with *Cyrena similis*, it is less heavy, more orbicular, and somewhat more inflated.

6. **Cyrena regularis**, Prime.

Cyrena *regularis*, Prime. Acad. N. S. Phil. Proc. 136. 1861.
Prime Cat. 6. 1863.

C. testa transversa, ovato-rotundata, valde inæquilaterali, in medio subinflata; latere antico, producto, angusto, rotundato, postico subtrun

Fig. 38.



Cyrena regularis.

cato; pagina interna candidissima; umbonibus parvis, obliquis, acutiusculis, incurvis, approximatis; striis irregularibus, obsoletis; epidermide fuscescente vestita; cardine angusto, incrassato; dentibus cardinalibus divergentibus, majoribus profunde canaliculatis; dente laterali antico conico, postico elongato, compresso.

Long. 78; lat. 67; diam. 40 mill.

Hab. ? Collect. Prime.

The shell is transverse, rounded oval, very inequilateral, and somewhat inflated in the centre of the discs. The anterior side is produced and narrow, the posterior side is subtruncated. The interior is white. The beaks are small, acute, they curve inwardly and are approximate. The striæ are irregular and nearly obsolete. The epidermis is dusky and without polish. The hinge is nearly straight and somewhat narrow. The cardinal teeth are elongated and narrow, the two principal ones are very deeply bifurcated, the central tooth is very broad. The lateral teeth are very short and small, the anterior tooth is conical, the posterior is slightly elongated, narrow, and not much raised.

Compared with *Cyrena sublobata,* this species is less heavy, more inflated, the anterior is narrower and the hinge is less broad and less strong. It differs from *Cyrena sinuosa* in being anteriorly narrower, posteriorly broader, and in having the hinge margin straighter.

Genus PISIDIUM.

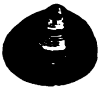
1. **Pisidium Nov-Zelandicum,** Prime.

Pisidium *Nov-Zelandicum,* Prime. Proc. Zool. 1862.
Prime Cat. 17. 1863.

P. testa minuta, transversa, ovali, subobliqua, valde inæquilaterali,

compressiuscula, tenui, postice subtruncata; umbonibus parvis, obtusiusculis; epidermide corneo-flavescente, nitente vestita.

FIG. 89.



P. Nov-Zelandicum.

Long. 4; lat. 3; diam. 2 mill.

Hab.—Nova-Zelandia. Collect. Cuming et Prime.

The shell is small, delicate, transverse, rounded-oval, very inequilateral, somewhat compressed, and a little oblique. The anterior side is produced, elongated and rounded, the posterior is somewhat abrupt. The beaks are small and obtuse. The epidermis is yellowish-horncolor and polished.

Very closely allied to ***Pisidium abditum*** and to ***Pisidium Casertanum***, it is however less inflated than either of these species.

VIII.—*Catalogue of Birds collected at the Island of Sombrero, W. I., with Observations by* A. A. JULIEN.

BY GEO. N. LAWRENCE.

suggested to Mr. Julien that a description of the locality, with such notes as he was able to make of the birds found there, would be desirable information to incorporate in a catalogue.

With this request he has complied, as will be seen by the annexed letter, in which he gives an account of some of the peculiar features of the island, together with some general remarks concerning the arrival and departure of birds; also notes on the habits of particular species, which are placed under those to which they refer, and indicated by quotation marks.

"SOMBRERO, Jan. 12, 1864.

"I have to-day, for the first time, a little leisure to commence the account I promised you of the occasional observations I have made upon the birds visiting this Key. They are necessarily of a merely popular character from my entire ignorance of the science, and I fear that the little time at my disposal will compel me to jot them down as they come into my recollection, without much systematic arrangement. During the first two years of my residence here (Aug. 1860 to Aug. 1862), my observations were altogether accidental and I made few notes, but I have paid particular attention to the subject during the past year (1863).

"The Island of Sombrero is a naked rock, about seven-eighths of a mile long, twenty to forty feet above the level of the sea, and from a few rods to about one-third of a mile in width. It is situated in the open sea (the Islands of St. Martin and Saba being just visible low down on the S. E. horizon), and exposed to the full force of the winds. There is no vegetation whatever on the island over two feet high; it consists merely of a few patches of 'prickly pear', a little grass, samphire, and other low herbs. In the centre of the widest part of the Key is a shallow layer of sand, all the rest of the surface is the naked rock. In the winter season the salt spray is carried entirely over some parts of the Key by the high winds.

"From this short description you will understand the insignificance of the locality, and the little likelihood of many species of birds being found here which I have seen or heard of in neighboring islands. On account of the diminutiveness of our Key, however, and the large force of laborers scattered over its surface, I have been able during the past year to get more or less acquainted with nearly every individual land bird and every species of sea bird that has chanced to visit us.

"Our birds may be arranged in three classes:

"I. Sea birds of the breeding season.

"II. Birds of the September passage.

"III. Land birds, stragglers.

"I. *Sea Birds of the Breeding Season.*

"Regularly every year in March large flocks of sea birds arrive here from the south, immediately build their nests, breed, and successively depart again to the southward with their young, during the latter part of May, June, and July. In past years, apparently from time immemorial, this Key has been greatly celebrated for the numbers of the sea birds visiting it in the spring, and the abundance of their eggs. The sloops and small craft of the neighboring islands made periodical visits here at this season, loaded themselves deep with the birds and eggs, and carried them to the St. Thomas market, which is the depôt of the surplus products of the islands in this part of the West Indies. I have met with several captains of vessels who in past voyages have stopped here to procure supplies of birds and eggs for their crews, and many of the laborers now upon the Key have often visited it before for this purpose; all

"In 1861 this class of birds arrived on the 29th of April in large flocks. Eggs were laid in large numbers until about the middle of June, and by August nearly all the birds had again flown southward.

"In 1862 large flocks suddenly arrived on March 18th. They were quite variable in their attendance on the Key, sometimes being present in large numbers, and occasionally being nearly all absent. The first egg was found on March 23d, and they continued to be laid in numbers (only about two or three thousand in all), until the latter part of May. Most departed in June, but a few flocks still remained until the latter part of August.

"In 1863 only a few individuals arrived, Feb. 22d, instead of the usual large flocks of Noddies, but a large flock of Royal Terns arrived in the following month. Nests were begun on May 4th, and on the 24th the first egg was found. The large flocks disappeared in the latter part of June, but a few remained until the end of August.

"II. *Birds of the September Passage.*

"In 1861, either in August or early in September (I omitted to note the date), large flocks of birds passed over the Key, coming from the N. W. and going to the S. E., *i. e.* towards St. Martin. Several of these flocks thus passed during several days, and only a few stragglers alighted upon the Key.

"In 1862, September, I was absent from the Key.

"In 1863, from Sept. 2d to Sept. 12th, several flocks passed in the same way, containing from three to about one hundred individuals. Flocks also passed during the night; cries were heard as if from many birds flying to the S. E. Some of these flocks appeared to consist of one species, others of two or more. Some of the flocks flew very high, but others at a less elevation. The following fact was observed in some cases both by myself and others upon the Key: as the flock arrived over the Key it hesitated in its flight, rose nearly vertically to a greater elevation, hesitated, again sank to its former level, and continued its flight towards the south-east. All this was done in a few seconds; we fancied they acted thus for the following reasons: that Sombrero was the first land they had made in their flight, that they hesitated to alight here, therefore rose to get a better view of the other islands (perhaps over intervening clouds), and having thus satisfied themselves continued their flight to their old haunts. Whence do these flocks come—from America or Bermuda?

"Many stragglers and small flocks settled upon the island and remained until the first part of October, from these were procured the specimens I sent you (*Charadrius Virginicus*). I should have mentioned that I left the Key in 1862 on the 14th August, and up to that time none of these flocks had passed. So that from the experience of the last three years I infer that these flocks regularly pass during the first fortnight in September.

"III. *Landbirds, Stragglers.*

"Most of the species included here do not come from the N. W. in September, in my experience, and I believe that they are perhaps all permanent residents of the neighboring large islands. Individuals make their first appearance especially during a calm or after a heavy gale. The number of species in this class which I have been able to obtain is very small. Besides the different species of Flycatchers, etc., which I saw during my first two years' residence, of which I have no specimens, and aside from the various kinds visiting parts of the Key and the vessels in port, which I did not see but was informed of, I have the local names of nearly twenty birds belonging perhaps to as many species, of my evident want of materials, but have jotted them down under the impression that perhaps you might cull out something new or peculiar to this locality, and such you may publish or dispose of in any way you think proper. ALEXIS A. JULIEN."

1. *Tinnunculus sparveroides* (Vigors).

"In 1863 one was seen, and one Oct. 21st; they are common in St. Martin."

2. *Margarops fuscatus* (Vieill.).

"'Thrush'; one shot, Sept. 28, 1863."

3. *Setophaga ruticilla* (Linn.).

"No local name, several specimens obtained."

4. *Hirundo horreorum*, Barton.

" Swallow,' sometimes called 'Hurricane bird,' from its abundance in St. Martin in the Hurricane Season, August to October. A large flock remained here from Sept. 22d to Nov. 3d. Notwithstanding the free exposure of this Key to the wind, flies are very abundant here, especially in calms like that which prevailed while the above flock of swallows was present."

5. *Vireosylvia atripennis*, Lawr. Proc. Phil. Acad. 1863, p. 106.

"No local name, probably belongs to some of the Windward Islands."

6. **Vireosylvia altiloqua** (Vieill.)?

This specimen, the only one in the collection, I have placed provisionally as *altiloqua*, but it differs so materially from that species (or rather from the only specimen of it I have for comparison), that I think it may possibly be distinct; should it so prove on a future comparison I suggest for it the specific name of *virginalis*.

The entire upper plumage is of a clear yellowish green, brighter on the rump and duller on the crown, but not at all inclining to ashy on the latter; tail light brownish olive with the outer webs the color of the back, the inner margins pale yellow; quills blackish brown edged with yellow-

ish green ; under wing coverts and inner margins of quills pale yellow ; a dull fulvous line runs from the bill over the eye, and a narrow dark mystachial stripe on each side of the chin ; under plumage white with a slight tinge of pale fulvous on the throat, greyish on the neck and upper part of the breast ; sides tinged with yellowish green ; under tail coverts clear pale yellow ; thighs brownish ash ; upper mandible blackish brown, the under whitish horn color ; tarsi and toes plumbeous black.

Length about 6 in.; wing 3¼; tail 2¼; bill ⅝; tarsi ¾.

It is of a much brighter color than *altiloqua*, being of a clear green without the brown cast which pervades the plumage of that species, only a shade of this color existing on the front, showing nothing like a decided cap.

7. *Tyrannus griseus*, Vieill.

"Local name 'Chincherry.'"

8. *Eulampis chlorolæmus*, Gould.

9. *Orthorhynchus exilis* (Gm.).

10. *Coccyzus Julieni*, Lawr., antea p. 42.

"In 1863, Oct. 20th, while taking a walk, I suddenly came upon this bird in a cavity of the rock ; he appeared greatly frightened ; having no gun with me I chased him, and a boy fat and easily shot. They are also a celebrated game bird in St. Martin."

Mr. Julien's observations under Section II. undoubtedly all relate to the migration of this species, which possesses peculiar interest both from its regularity and the great distance accomplished without rest. The periodical southern flight takes place at the end of August; at that time a succession of flocks leaves the North American continent about Nova Scotia, and striking boldly out to sea they take a direct line south, passing over or to the east of Bermuda, and making no stops, if not interfered with by storms, until the West Indies are reached, even passing over the first of these in their course.

In some seasons large numbers suddenly appear on Montauk Point, the easternmost extremity of Long Island. What is designated as Montauk Point is nine miles in length by one and a half to two miles in breadth; it is connected with the neighboring portion of Long Island by a sand beach of five miles in extent, and has the appearance of having at one time been detached from it. It differs strikingly in formation and appearance from the adjacent shore, consisting of a succession of immense hills, with a bold rocky shore on the sea side. The original sod on the entire Point remains unbroken by the plough, being only used for pasturage; excepting the Lighthouse there are but three buildings upon it, these are occupied by the keepers having in charge. the stock sent there for the summer.

In August, 1858, I was spending a few days on the Point, and had quarters with Mr. Patrick Gould, who occupied the last or most easterly house; he had long been a resident there, and was an intelligent observer. I inquired of him in reference to the great flights of Plover that occasionally took place; he stated that when they appeared in such numbers it was about the 28th of August, not varying more than a day or two from that time, and then only when a south-east storm drove them on the island from their regular course over the sea. I had made arrangements to leave on the 27th. In the morning of that day there were symptoms of a S. E. storm ; Mr. Gould then predicted that on the following day one of the large flights of Plover would occur. The storm commenced about noon, and as I rode over the hills in the afternoon to leave the Point flocks began to appear. As I learned afterwards Mr. Gould's prediction was fully verified, for on the 28th the birds came in unusual numbers. In these visitations they remain but a short time, the main body moving on south in two or three days. Every season a few flocks pass the Point at the time of their migration.

From long observation Mr. Gould had noticed that unless a storm occurred just at the time named by him no unusual flight took place, showing that their principal migration is made each year at a fixed period and is over in two or three days.

I have noticed for several years that a flight of this species, whether large or small, always took place on the last two or three days of August.

A very interesting account, with many data of the southerly migration of this species, is given in an article by J. L. Hurdis, Esq., published in "The Naturalist in Bermuda."

16. *Aegialitis semipalmatus* (Bon.).

"Nobody here could identify this bird. A pair lit in the sea among the vessels in port, one was disabled by a blow with an oar and captured."

24. *Querquedula discors* (Linn.).

"'Teal.' In 1863 a flock of nine arrived on the night of Oct. 11th, but departed the following morning on being alarmed by the negroes, with the exception of one which I shot. This one appeared greatly fatigued, as if from long flight. In 1860 a pair was shot. These are the only two cases in which wild ducks have been seen here."

25. *Pelecanus fuscus*, Linn.

"'Brown Pelican.' A few occasionally arrive here in the spring from the south, but do not remain; I have never seen nor heard of a nest or eggs of this species here. At St. Martin they may be seen all the year round, and breed upon the neighboring little Keys. They are caught there by nailing a small fish or bit of pork upon a plank, so arranged as to remain just beneath the surface; when spied by the Pelican he makes his usual downward plunge, and is disabled or killed by coming in contact with the plank. It is not uncommon in St. Martin and St. Thomas to see tame Pelicans attached to houses. During the day they go out to fish and return at night to roost with the fowls. Several are thus attached to the French garrison at Marigot, St. Martin, and when the fishing boats come in to the harbor the Pelicans are regularly on hand to receive their share of the spoils. So tame are they that amusing contests sometimes occur between them and the fishermen, in their efforts to obtain a larger portion by theft."

26. *Sula fiber*, Linn.

"'Booby.' During the winter only a few are to be seen, but in the spring they increase in number; a large flock suddenly arrives in June or July and remains until November. They never alight on the top of the cliff, but on the ledges at the sides. They fly low over the water chasing the shoals of small fish. I have never seen its nest or egg."

27. *Tachypetes aquilus* (Linn.).

"'Frigate Bird.' This species is almost our constant companion, from two to twelve or more pair being generally present. They breed in June and July. The nest is made out of twigs, and is about one foot in diameter and four or five inches high. But one egg is laid, sometimes short and oval and sometimes long and elliptical. These nests are never made in crevices, but on the top of the cliff at the extremity of the Key, overhanging the sea. I have never seen them quarrel, but, on the contrary, they appear to be very social; and when several pairs nest together the nests almost touch each other, the males standing and sitting around them in a close group. The females on their nests always sit facing to windward, as indeed do all other sea birds when their nests are exposed to the wind.

"They are often very tame. I have frequently approached a group like that just mentioned (the females on their nests surrounded by the males), slowly and steadily. The males would first fly away when I came within twenty feet of them, but the females would remain looking around for the cause of alarm, in a bewildered manner, as if shortsighted; and I have sometimes obtained (large and of a purple color), this is the only one I have ever seen or that has been laid here during the last three years; it was unfortunately broken. In 1863 a few were seen at intervals from February 7th to June 8th, when the last one was observed and shot. It will be thus seen that these birds are rare here. However, a captain who landed in 1848 informed me that they were then present, as well as the other sea birds, in prodigious numbers."

29. *Phaeton flavirostris*, Brandt.

Mr. Julien described one specimen of Tropic bird that came under his notice, which undoubtedly was this species.

30. *Chroicocephalus atricilla* (Linn.).

"'Laughing Gull.' This species is not abundant; they associate with the Royal Terns in the same manner as the Sooty Terns with the Noddies."

31. *Thalasseus regius*, Gambel.

"'White Gull.' In 1862 a large flock arrived May 13th, the first egg was found June 5th; there were large flocks in July and August, they left the middle of August. In 1863 large numbers arrived April 16th and departed the same day. The attendance of this species was very variable this year, sometimes going out every morning as if to fish and coming back every night; sometimes departing for one or more weeks and again suddenly returning; again being represented by a few pair sitting upon the buoys, which are moored a considerable distance to the westward of the Key. In this latter habit they are peculiar, as most of the sea birds, and especially the Noddies, never frequent the buoys, but prefer to rest upon the Key. June 28th, large flocks of this species and an abundance of their eggs were found to-day, by the schooner attendant upon this island, upon 'Little Dog Island,' a small Key some twenty miles to S. E. A large flock remained at Sombrero all July and departed August 13th. The flocks of this species present a very pretty snow-white appearance when settled upon the ground. They prefer to rest on the sandy tract or upon the level portions of the rock. Their nests are always made in the sand, and contain each one egg. I have found it extremely difficult to get a shot at these flocks, as they are very shy and easily alarmed. The captain of a vessel who shot several for me, stated that he saw the whole flock pounce upon a wounded one and tear it to pieces."

32. *Haliplana discolor*, Coues. Ibis 1864, p. 392.

"'Egg bird.'. So called, I presume, from the abundance of the eggs derived from it; for I am inclined to believe that in former years the number of its individuals visiting this Key has been surpassed only by that of the Noddy and Royal Tern. It is peculiar especially for its social habits in regard to the Noddy; whatever may be its numbers upon the Key it is almost always to be found in the flocks of Noddies. They arrive in March and depart in August. This species makes its nest about after the same fashion as the Noddy, and lays but one egg. It often flies high with a noisy chatter, very different from the discordant 'caw, caw' of the Noddy, and a quick darting motion. I have never noticed the two species to quarrel, though the individuals of both will often fight long and obstinately with each other."

of *fuliginosa* is smoky black; in the latter species the white on the side of the head terminates in a point over the eye, the upper eyelid being black; in *discolor* the white extends over and beyond the eye, with the upper eyelid white, and the black line from the eye extends further forward separating the white from the edge of the bill; in *fuliginosa* the white of the front comes to the edge of the bill forward of the black.*

The egg of this species measures 1⅞ by 1¼ inches; the ground color is creamy white marked with blotches of deep rusty brown, most abundant on the larger end.

33. *Anous stolidus* (Linn.).

"'Noddy.' From my own and the observations of others, this species appears to have been always represented by the greatest number of individuals. During my residence its eggs have been by far the most abundant of all. They usually arrive in March and depart about the middle of August. On account of their exceeding tameness these birds are easily knocked down with a stick, and in former breeding seasons large quantities of them were thus despatched, plucked, and thrown into brine, for sale in St. Thomas. As an instance of their tameness, many used to make their nests in crevices of the cliff, within a few feet of the shute down which the lumps of guano are thrown into the lighters. They appeared entirely undisturbed by the roar and enveloping clouds of fine dust. Their nests are of two kinds. For the first the Noddy gathers together, by carrying in its bill, a considerable quantity of bits of shells, deposits them in a shallow cavity of the rock, say eight to twelve inches in diameter, deepens a little the centre of the basin, and thereon lays her egg. Occasionally such a nest is also encircled with a few twigs; sometimes it consists of over fifty pieces of shell, but more frequently the shells and twigs are so scant that the egg lies upon the bare rock. The nests built in the crevices of the cliff, however, consist chiefly of twigs, though even these are frequently capped by a few bits of shell upon which the egg immediately lies. The Noddies are often thievish when building their nests; where two pair are thus engaged in close proximity, the one will often repeatedly carry off to their own nest from that of the other in their absence. On the return of the owners to their spoiled home, and especially when the attempt is repeated in their presence, an amusing altercation ensues, and sometimes a fight. The Noddies especially, among the sea-birds, have always suffered severely from the ravages of cats, of which a number have run wild over the Key. These, and the neighborhood of man, have been rapidly frightening them away.

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* This species may be added to the Fauna of the United States, as I have a specimen from Mr. Audubon's collection, obtained on the coast of Florida.

"It has been an amusing sight to see a large flock sometimes settle down immediately around a blast hole, after the laborers had ignited the fuse and run away, and again rise, expressing their noisy astonishment at the report. The surface of the Key is very rough, and offers these birds an abundance of cavities for building their nests; they lay indiscriminately over the surface, inland as much as near the cliff, but never on the central tract of sand. Only one egg is laid in a nest."

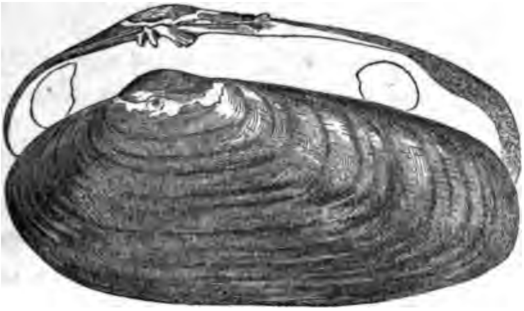
IX.—*Description of a* NEW SPECIES *of Mollusca, of the Genus* GLAUCONOME.

By TEMPLE PRIME.

Read April 8, 1865.

Glauconome oblonga, nov. sp.

Gl. testa elongata, oblonga, valde inæquilaterali; latere antico brevi rotundato, postico obtuso; epidermide rugosa, viridi-fuscescente induta; striis irregularibus; valvis intus albis; umbonibus obtusis, sæpius erosis; cardine angusto; dentibus inæqualibus, divergentibus; in valva dextra dente postico bifido, in sinistra mediano bifido.



Glauconome oblonga.

Long. 68; lat. 31; diam. 20 mill.

Habitat.—Singapore. Collect. Cuming et Wheatley.

The shell is elongated, oblong and very inequilateral. The anterior side is rounded, and the posterior obtuse. The epidermis is brownish-green, uneven and without polish. The striæ are irregular and light. The beaks are obtuse and often eroded. The hinge is narrow. The teeth are divergent. The posterior tooth in the right valve, and the central tooth in the left valve, are bifid.

This species is very closely allied to *Gl. Jayana* from Australia; the margins are, however, more rounded, the epidermis is not of so brilliant a green, and the teeth are somewhat different. Compared with *Gl. rugosa* from Manilla, the margins are more rounded, the valves are fuller, and the teeth are larger.

X.—*Report upon the Past and Present History of the Geology of New York Island.*

By R. P. Stevens.

Read January 16, 1865.

The Past History of the Geology of New York Island.

In 1816, Mr. Hayden, in the Geological portion of Prof. Cleveland's Mineralogy, describes a granite ridge, crossing New York Island, and appearing at Hurlgate on Long Island, thence extending into Connecticut.

it did, with the geology of the adjacent mainland and islands, and describing the points of difference.

The following is an abbreviated description of the Island of New York, from Akerly's Essay:

"The south part is an alluvial, on a granitical base, which appears at the Battery. The northern part of the Island is of the primitive formation. The body of granitical rock, forming the base of the Island, has a direction nearly between southwest and northeast. It appears to be veined or stratified in that direction, as may be seen where quarries have been opened to procure building stone. Where no disintegration has taken place from decomposition, the color of the rock is bluish or grayish blue.

"The various aggregates found among granite are seen in different parts of this country—as granatines (ternary combinations), granitelles (binary aggregates), granilites (aggregates of more than three components), gneiss, etc.

"Rocks, in which magnesian earth predominates, are frequently found, though not in large masses, but mostly in detached pieces. Some of these are steatites, some serpentines, and others asbestus. Many elegant specimens of steatites may be procured, some of which have handsome dendritical appearances upon them.

"The serpentines are not very beautiful; but there are a great variety of the forms of asbestus, some of which approach to amianthus. The stellate, the plumose, and the fibrous asbestus, are met with as well as the ligniform.

"On the northernmost part of the Island of New York, near where it is united to Westchester by Kingsbridge, is the commencement of a limestone formation of the primitive class. It is white and granular, and contains beds and veins of quartz and granite, and is also associated with tremolite. Rubilite, or red schorl, has been found in it; and our associates, the Rev. Frederick C. Shaeffer, and Dr. Peter S. Townsend, have also discovered pyroxene in this limestone.

"The limestone (says Dr. Bruce) has running through it, in different directions, veins from one to three or four inches thick, composed of quartz, feldspar, and mica, and granular limestone, through which the oxyde of *Titanium* is sparingly disseminated.

"The quartz is of the fœtid kind, giving out an unpleasant odor on being fractured."

In 1839, L. D. Gale, M.D., resident member of our Society, in the preliminary report on the geology of the first district of the State, gives the first minute and detailed description of the geology and topography of the island.

He considers the elevation of the Island to be due to a force acting in a N.N.E. and S.S.E. direction. By it, Staten Island, Governor's Island, the smaller islands of New York Bay, with Manhattan, were elevated. From the Island it passed by Hurlgate, through Westchester into Dutchess, Chesnut Ridge, and Winchell Mountain, belonging to it.

He was the first to give the geological topography of the Island, as being a *group of gneissoid islands*, and separated from each other by low levels, slightly elevated above tide and filled with drift or alluvial.

Dr. Gale's observations on the character of the rock, its dip and strike, and its surface markings, were very accurate, and need at the present time no emendations. The following is his description of the Island of New York.:

hundred feet west of Tenth Avenue, the rock is entirely changed, both in composition and structure. In composition, it is a mixture of limestone and serpentine; while in structure it is destitute of strata, and lies in beds.

"*Anthophyllite locality.*—This rock extends from W. 59th st. to 63d st., its strike is N. 30° E. At 63d st. it is talcose in structure, and may be split into thin slabs; in others it is dark grey, almost black, composed of straight fibres arranged in a columnar form, meeting and crossing each other frequently at right angles.

Drift Striæ.—These vary from N. 25° W. to N. 48° W., depth of striæ from a few lines to one and a half inches.

"From W. 195th st. to 197th st., there is an opening through the western ridge, forming a continuous valley from the Hudson to the Spuyten-Duyvel creek. Through this valley, vast masses of drifts have been carried and piled up in conical hills east of the road, and on the northern slope of the eastern ridge."

In 1840, Prof. H. D. Rogers, corresponding member of the Lyceum, in his Geological Report of the State of New Jersey, describes the gneiss of the seaboard rocks as appearing at Trenton and Jersey City, N. J., on Staten Island and Manhattan. He was the first to draw a distinction between the gneiss of the Atlantic and the Highlands—the former having mica, talc, chlorite, and other laminated minerals of the micaceous order as prominent ingredients, thereby differing from the latter.

In 1843, Mr. W. W. Mather, to whom was committed the geological examination of the First District of the State of New York, brought out his final report, in the fourth volume of the NATURAL HISTORY OF NEW YORK, accompanied by a geological and topographical map of the Island of Manhattan. His brief description is as follows:

"The *Island of New York* is underlaid by rocks of gneiss, micaceous gneiss, hornblendic gneiss, hornblendic slate, hornblendic rock, limestone, the anthophyllite rock, and granite. The micaceous gneiss is the prevailing rock. The strata are nearly vertical, some dipping eastward, and some westward. The strike is also variable from northeast to northwest, but north-northeast is the prevailing direction. Granite in numerous beds and veins, some of which are very tortuous, were observed. At Hurlgate ferry, at the east end of 86th st., the strata are vertical, and are of gneiss more or less hornblendic, interlaminated with beds and irregular masses of granite. The strata are frequently bent where these irregular masses of granite were observed."

In the same year (1843), Mr. Issachar Cozzens,* resident member and Librarian of the Society, published a small volume on the Geology of New York and the adjacent Islands, illustrated by colored maps and sections.

It is one of the best contributions made upon the subject, and abounds in many important and pleasing local reminiscences. The following is his description of our Island.

"This island is about thirteen miles long. It consists of eight different series or formations of rock, as follows:

"1st. *Granite.*—This begins to show itself at 28th st., a little east of 8th avenue, and runs in an interrupted line to the North River at 32d st.; from thence, it is seen between the 10th avenue and river, and paralscales of silvery and golden talc, accompanied by a vein, about twelve feet wide, of anthophyllite. This vein is in a vertical position. Actinolite is found imbedded in the serpentine. At the south end there is a vein of carbonate of lime. This carbonate of lime has small specks of serpentine diffused through it, and forms a kind of 'verd antique,' which, when polished, makes handsome specimens.

"4th. *Gneiss.*—This rock has a greater extent, and shows itself more than any other on this island; it begins at the Battery, which it underlies; it was to be seen also at the lower end of E. 14th st.; in 8th st. west of the 3d avenue, in digging a well, it was found eighteen feet below the surface.

"This rock begins on the south side of, and underlies Governor's Island, which is its most southern extent, passing through New York Island, and running through the greater part of Westchester Co.; it forms the rock at the straits called Hell-gate, and even at that place (where it may be traced some eight or ten miles) underlying Long Island.

"The gneiss of New York Island is a peculiar variety. It has more mica than common, and which is also in larger plates than usual for this rock. The dip of this rock varies from the extreme of horizontal to vertical.

"5th. *Hornblende Slate.*—This rock is associated with the gneiss in many parts of the island; at Spuyten-Duyvel bluff, at the north end of the island, also at Manhattanville.

"6th. *Quartz Rock.*—These are on the 10th avenue, near 60th st. Veins of various thickness of grey, granular quartz.

"7th. *Primitive Limestone* of King's Bridge is well known; it is a dolomite, and has all the varieties of white, grey, and light blue, granular, coarse marble; it begins at the south end of Mr. Dyckman's farm, and runs through the middle of the Island to Spuyten-Duyvel creek; this formation rests on granite. There were then (forty years ago) three foot marks, two left feet, and one right one, on the smooth surface of the limestone, on the north end of the formation near the road.

"8th. *Diluvium.*—This formation covers almost all the island; on the lower end of the island it is of the greatest depth (100 feet), in it are found types of all the rocks of the valley of the Hudson."

Present History of the Geology of New York Island.

Since the publication of the work of Mr. Cozzens, there has not appeared any contribution to the geological knowledge of New York Island. The artificial sections of its rock have been largely increased in number, by the opening of new streets and avenues, and the improvements at the Central Park. Probably there is not another spot on the face of the globe where, in so easy and accessible a manner, such numerous sections of gneissoid and metamorphic rocks can be seen, as on the upper end of our Island. We have, as roughly calculated, from 75 to 100 miles of artificial, and at least twenty miles of natural sections.

The artificial sections throw new light upon the structure of the rock mass, and will be alluded to in this report.

Our rocks are a portion of the main land in Westchester Co., from which we are cut off by a profound fault, a cross fracture in part, originally narrow, but widened by the abrading power of water and ice, gravel and boulders, and, in part, by rupture of the strata longitudinally, with subsequent abrasion.

Beginning, on the North River, at Spuyten-Duyvel Bridge, Island, there is a longitudinal fracture through limestone and gneiss, extending from the main land as far south as Avenue A. South of this point we infer a continuation of it to the southern extremity of the island. A similar longitudinal fracture begins at Dobb's Ferry and Hastings, through the same rocks as the eastern, and extends the whole length of the island, forming the channel of the North River, separating it from New Jersey.

The cause and reason of these longitudinal fractures will be explained as we progress in our report.

The main mass of the rocks of the island is gneiss. In the gneiss lie veins and beds of granite, anthophyllite, and hornblende.

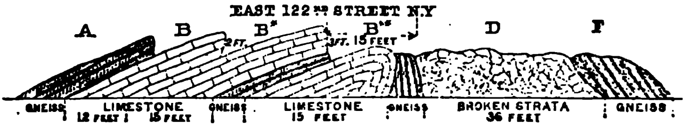
GRANITE.—When this rock occurs in veins, their strike is generally coincident with that of the gneiss, viz. N.N.E. and S.S.W. Their angle of dip is also coincident with that of the gneiss. The granite is interlaminated with the stratification of the gneiss. These veins are much more numerous upon the western than on the eastern side of the island. They vary in thickness from a few inches to sixteen feet. Their extent, N. and S., is limited not by fault or fracture, but by an insensible fading out into gneiss. In the process of grading streets and of levelling blocks of lots, they are often completely removed, thus showing that they have not been injected from beneath; and I am led to the conclusion that they are of metamorphic origin, similar to the gneiss itself.

When granite occurs in massive beds, as at the corner of E. 53d st. and 4th avenue, it lies across the strata; and when the metamorphism is perfect, it can be distinctly separated from the gneiss; but following the mass along the fresh excavations, it is seen to insensibly blend into gneiss, similar to the veins. When the active forces of the ancient "Ice Period" acted upon the softer gneiss, removing it from around the granite, on its northern aspect, it gives it the form of large rounded bosses and sometimes ridges.

Hornblende, Anthophyllite, and other masses.—Similar remarks to the above on granite will apply to these masses; they are simply different conditions of the same elementary materials as the gneiss, merely different forms of metamorphism.

Limestone.—The Kingsbridge mass has been fully described and needs no further remarks from me, except that, on the western bounds, there is evidently a partial overthrow of the mass, so that the western wall has an eastern dip, similar to the eastern, while the central is vertical.

East of 6th avenue, in grading W. 132d st., another bed of limestone is revealed, having an eastern and western dip on its respective flanks; its arch is plainly visible, and the gneiss reposing conformably upon it. This is a continuation southwards of the limestone of the Clove, north of McComb's Dam, Westchester Co.



This fold of limestone has been cut through at the "Montauk Steel Works" on the main land at Mott Haven. Its base is one hundred feet wide, and the height is about twenty feet. The thrust of large masses of limestone into the solid gneiss was seen, crushing and grinding the latter as it passed, showing that the rocks were hardened when the folding action took place, and the thrust was made.

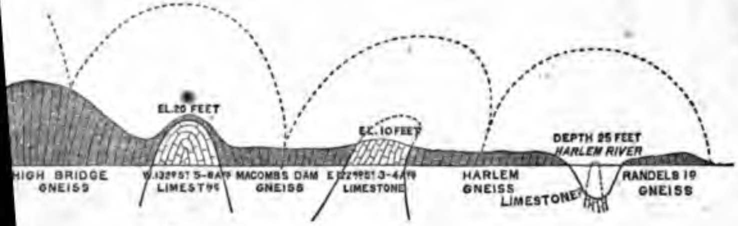
At Melrose, on the mainland, there is another bed of limestone which is traceable to Harlem River. This bed, traced under the strait separating Barn and Randall's Islands from New York, would explain the westward dip of the gneiss along East River, and the eastern dip of the same rock on the small islands of Hurlgate, and also the location of limestone formerly to be seen at Corlear's Hook, Avenue A or B.

The fracture of this fold, and its subsequent abrasion, has caused the channel now filled in part with the waters of East River.

Upon the mainland in Westchester Co., at Hastings, is another bed of marble, which, continued southwards, would underlie the Hudson River. Reasoning by analogy, we infer that this is the case, for in no other way can we account for the beds of limestone at Hoboken; we have, therefore, in our section of the rocks across from N. J. to Randall's Island, so placed it. We have good geological reason for inferring that the North River flows through similar fractures and abrasions of folds of gneiss and limestone from Haverstraw Bay to the Narrows.

Our section is a constructed one, and therefore in part artificial, but if a section had been made from Kingsbridge marble directly eastwards, across Westchester Co., all the beds of limestone would have been found in precisely similar conditions and geological positions, and which are the northward continuations of those upon our island.

In addition to the foldings of the strata in a longitudinal direction, there are other disturbances of strata, which will



thern shore of Spuyten-Duyvel Creek and Harlem River.

now be mentioned. The first is a cross-fracture at Tubby Hook, extending from the Hudson River to the lowlands of the Harlem River; the second great one is at Manhattanville, extending by the upper part of the Central Park, through Harlem Creek to the East River; a third one is along the creek crossed by 2d avenue at E. 50th st.; a fourth along the creek, near E. 20th st.; and probably there was a fifth rivalling the second, crossing the island, along Canal and Centre streets, by the old Collect Pond and Ferry st. to the East River; the sixth separates our island from Governor's Island.

At the fracture in E. 50th st., and some other localities, a northward incline of the rocks is visible, but the general incline is southward from 3° to 8°. This incline can be readily seen at the lower tunnel, and Yorkville Tunnel of the Harlem Railroad. It is this southward incline of the rock mass, as well as its abrasion, that carries the rocks from a height of 180 feet at the highest northern point, to a level below high tide at Canal street.

Under what previous classification of American Rocks does the New York group arrange itself?

So far as my reading extends, it was Nuttall (*vide* his account of Franklin, N. J., in Silliman's Journal, Vol. V., A.D. 1822), who first considered the rocks flanking the Highlands as metamorphic. To the late Prof. Emmons belongs the honor of developing his Taconic system. These he always considered a part of it. Mather seems at first to have coincided with him, but afterwards changed his mind and called them metamorphosed lower Silurian.

If we look at the lower sedimentary rocks flanking the great primary (Laurentian) centres, we shall find that each of them has its own peculiar system of sandstones, slates, and limestones, or one or two of them.

New York group differs from the true type of the Taconic, in the absence of the lower members. These would, in their regular sequence, not reach our island but underlie Long

Island. We have four (or six including those under water) beds of limestone, with their associated shales and limestone shales, the former metamorphosed into marble, and the latter into gneiss and calciferous gneiss—granite or hornblende.

The conclusion which we have arrived at is, that the rocks of New York Island are metamorphosed Taconic, and worthy of the name of MANHATTAN GROUP.

XI.—*Examination of a few American Minerals.*

By CHARLES A. JOY,
Professor of Chemistry, Columbia College, New York.

Read May 15, 1865.

1. *Silicate of Copper*, *Chrysocolla*, Copper Harbor, Lake Superior.

THIS specimen was one of the earliest brought from Lake Superior, and was interesting on account of the proximity of

The 1·294 grms. of silicate yielded by analysis:

Water, . . .	0·3429 grms.	in 100 parts;			26·50
Silica, . . .	0·414	"	"	"	32·00
Oxide of copper, .	0·4237	"	"	"	32·75
Iron and alumina,	0·100	"	"	"	7·75
	1·2806				99·00

The following analyses are added for comparison:
1. Smith, Chili; 2. Field, Chili; 3. Joy, Copper Harbor; 4. Jackson, Copper Harbor; 5. Berthier, Somerville, N. J.

	1.	2.	3.	4.	5.
Silica, ...	31·35	28·21	32·00	37·85	35·40
Oxide of copper, .	42·51	39·50	32·75	27·97	35·10
Water, ...	21·62	24·52	26·50	20·00	28.50
Sesqui-oxide of iron, .	1·97	2·80	7·75	8·90	1·00
Alumina, ...	2·83	4·97		4·80	
	100·28	100·00	99·00	99·52	100·00

2. *Black Oxide of Copper.*

Some years ago I saw tons of this mineral excavated from a bed in the conglomerate at Copper Harbor. The miners supposed that the supply would prove inexhaustible, and comparatively few specimens were saved. Many rounded pebbles of black oxide were found on the shore of the lake, and in the mine; they presented a rounded or indented surface, not unlike many metallic meteorites.

Whitney* found for the specific gravity of a very pure specimen, 6·25. Another specimen gave me 5·952.†

I analysed three specimens with the following result:

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* Report II., 100.

† Pogg. Ann. LXXX., 286.

	1.	2.	3.
Silica, . . .	3·082	3·38	
Oxide of copper,	93·064	95·20 by loss.	99·45
Oxide of iron, .	1·066	1·19	
Lime, . . .	0·217	0·23	
Loss, . . .	2·571		0.55
	100·000	100·00	100·00

3. *Mesotype*, New York City.

This specimen was believed to have come from the Island of New York. As I have since found it on Second Avenue, near 50th st., there appears to be very little doubt on the subject.

The formula given by Rammelsberg for Mesotype is NaO, $SiO_3+Al_2O_3$, SiO_3+2 HO.

I obtained with 1·775 grms. material

		Found.	Formula.
Silica, . .	0·835 grms.	47·04	47·86
Soda, . .	0·475 "	14·56	16·20
Alumina, .	0·2584 "	26·76	26·62

5. *Magnesite*, Hoboken, N. J.

I obtained this specimen from a vein in the serpentine. It was absolutely white and free from impurities, and found to be nearly pure carbonate of magnesia.

Mr. H. B. Cornwall analysed it with great care, and reported the following results:

Magnesia,	46·71	Carbonate of magnesia,	98·45
Lime,	trace	Carbonate of iron,	0·90
Protox. iron,	0·56		
Water,	0·30		0·30
Carbonic acid,	50·00		
Silica,	0·23		0·23
	97·80		99·88

6. *Anthophyllite*, New York City.

There are numerous boulders of this mineral found on the Island of New York, and it also occurs *in situ* near the corner of 59th st. and 10th avenue. I found the specimen, which I gave to Mr. Cornwall for analysis, on 49th st., near Columbia College.

A fragment was taken from the interior of the boulder and carefully pulverized. 0·443 grms. heated to whiteness lost 0·038 grms. = 8·577 per cent.

0·336 grms. were fused with a mixture of carbonates of soda and potassa, and the mass dissolved in hydrochloric acid, obtained silica 0·156 grms. = 46·428 per cent.

The acid solution was nearly neutralized with carbonate of soda, and boiled with excess of acetate of soda, and the precipitated acetate of iron converted into sesquioxide by ignition, found 0·035 grms. = 9·375 per cent. protoxide.

The lime was precipitated by oxalate of ammonia, and converted into carbonate by ignition; found 0·017 grms. = 5·059 per cent. lime. Manganese was precipitated by sulphide of ammonium, re-dissolved in hydrochloric acid, and precipitated as carbonate, found 1·383 per cent. protoxide.

Magnesia was precipitated as phosphate, found 28·803 per cent.

The following is the result of the analysis.

	1.		2*.
Silica,	46·428		58·43
Magnesia,	28·803		29·34
Lime,	5·059	Alumina,	trace.
Protoxide of iron,	9·375		8·76
Protoxide of manganese,	1·383	Soda,	0·88
Water,	8·577		2·26
	99·625		99·67

7. *Dolomite*, Westchester Co.

This mineral is found, according to Dr. Stevens, traversing portions of the Island of New York. It was observed on 49th st., near Columbia College.

8. *Copper Pyrites*, Ellenville, N. Y.

Mr. Cornwall brought specimens from this locality and analysed one in my laboratory.

The mineral was associated with galena, blende, and quartz. 0·985 grms. were treated with boiling aqua regia, leaving 0·002 grms. = 0.203 per cent silica. All the sulphur was oxidized and precipitated as sulphate of baryta; the sulphate weighed 2·631 grms. = 0·361 grms. or 36·649 of sulphur. The copper and lead were precipitated by sulphuretted hydrogen, and the sulphides dissolved in nitric acid. The lead was separated from the copper by evaporating to dryness with sulphuric acid and washing out the sulphate of copper with water. Found sulphate of lead 0·005 grms. = 0·003 grms. or 0.304 per cent. lead.

The copper was determined from a fresh portion after separating the lead, iron, and silica, by precipitating with caustic potassa. 0.481 grms. of the ore were taken; found, oxide of copper 0·196=32·432 per cent.

The iron was precipitated by ammonia, and weighed as sesquioxide—from 0·800 grms. of the ore—found 0·358 grms. =31·25 per cent. iron.

Results of the analysis.

Copper,	32·432	Cu_2S,	40·615
Iron,	31·250	Fe_2S_3,	58·071
Sulphur,	36·649	PbS,	0.351
Lead,	0.304	SiO_2	0.203
Silica,	0·203		
Zinc,	trace.		
	100·838		99·240

New York, May 1, 1865.

XII.—*Descriptions of* NEW SPECIES *of Birds of the Families* TANAGRIDÆ, DENDROCOLAPTIDÆ, FORMICARIDÆ, TYRANNIDÆ, *and* TROCHILIDÆ.

By GEO. N. LAWRENCE.

Read May 1st, 1865.

FAM. TANAGRIDÆ.

1. **Buarremon Ocai,** nov. sp.

Male. Front, crown as far as on a line with the middle of the eyes, and sides of the crown, black; hind part of crown and occiput chestnut red, each feather faintly tipped with black; a narrow longitudinal line on the front and a superciliary streak running from the bill to the hind neck white, sides of the head black; back, wings, and tail clear yellowish green, a little duller on the rump; quills brown on their inner webs, the outer webs margined with yellowish green, except the entire outer web of the first primary, a portion of the others towards their points and the ends of the secondaries, where they are narrowly edged with greyish ash; the smaller wing coverts broadly margined with lighter, more yellow; the reddish spot on the crown paler and more restricted; it has a white, superciliary streak, and the white of the throat is divided by black lines, neither of which exists in the other; the tail of *B. brunneinuchus* is deep brown, whereas in the present species the inner webs are olive green, with the central feathers and the outer webs of the others, the same color as the back.

FAM. DENDROCOLAPTIDÆ.

2. **Philydor rufobrunneus**, nov. sp.

Front, crown, and sides of the head dark olivaceous brown, the feathers with somewhat lighter centres; a greyish spot on the lores; back and wings reddish-brown, rump rather brighter, upper tail coverts dark rufous brown; tail deep cinnamon or dark brownish rufous; quills blackish brown, the outer webs the color of the back; under lining of wings bright cinnamon, inner margins of quills reddish salmon color; throat bright ferruginous, breast and abdomen brownish rufous, brighter on the middle of the latter; each feather of the breast with a light ferruginous stripe down its centre; sides like the back in color; under tail coverts rufous; bill black; tarsi and toes blackish brown.

Length 9 inches; wing $3\frac{5}{8}$; tail $3\frac{7}{8}$; bill $\frac{7}{8}$; tarsi $1\frac{1}{16}$.

Habitat.—Costa Rica, San Jose. Collected by Dr. A. von Frantzius. Mus. Smith. Inst., Washington, D.C.

3. **Anabazenops lineatus**, nov. sp.

Female. Entire upper plumage dull rufous brown; upper tail coverts deep bright rufous, tail dark brownish rufous; inner webs of quills blackish brown; chin and upper part of throat pale fawn color; under plumage dull rufous brown, lighter than above, and paler on the abdomen; the feathers of the crown, sides of the head, hind neck, upper part of the back and breast are marked down their centres with narrow lines of a pale ochreous or fawn color; these lines also exist on the abdomen, becoming paler as they descend, until on the lower part they are almost obsolete; under lining of wings light rufous, inner margins of quills pale cinnamon; under tail coverts dark rufous; upper mandible blackish horn color, the under at base pale yellowish white; tarsi and toes dark brown.

Length 8 inches; wing 3⅜; tail 3⅛; bill ¾; tarsi ⅞.

Habitat.—Costa Rica, Angostura. Collected by J. Carmiol. Mus. Smith. Inst.

4. **Margarornis rubiginosa**, nov. sp.

Back, wings, and tail of a deep bright rufous or dark rust color, tail slightly paler and duller, with the shafts red; crown more brownish, hind neck lighter in color, the sides of the head pale rufous; a narrow post-ocular stripe, and the throat ochraceous white; under plumage of a lighter rufous than the back, and paler on the middle of the abdomen; on the upper part of the breast the feathers are marked in the centre with small spots of ochreous white, the ends of the spots are narrowly margined with black; under wing coverts and inner webs of quills at the base pale yellowish rufous; the terminal portion of the inner webs of the quill feathers blackish brown; under tail coverts dark rufous; upper mandible light brown, the under pale yellowish white; tarsi and

centres; hind neck and upper part of back brown, with the feathers marked down their centres with pale rufous, and margined with brownish black; middle of back tinged with rufous, becoming bright rufous on the rump and upper tail coverts; tail dark brownish rufous, with the shafts brown; quill feathers blackish brown, the outer webs with rufous margins; wing coverts the color of the back, each feather having at the end a distinct spot of light rufous edged with black; a post-ocular stripe of pale rufous; throat pale ochreous; sides of the head, the neck, breast, and abdomen brown, closely marked with guttate spots of a pale ochreous color tinged with rufous, most so on the abdomen, becoming duller and less distinct on the lower part of the belly; all these spots are margined with blackish brown; under wing coverts pale rufous, inner edges of quills and inner webs at base light salmon color; upper mandible black, the under yellowish white; legs brown.

Length of skin 5½ inches; wing 2½; tail 2¾; bill ½; tarsi ¾.

Habitat.—Ecuador, Quito.

Remarks.—This bird differs from the preceding species and *M. squamigera* in the decided spots of its upper plumage and wing coverts; in the brown portions of its plumage it somewhat resembles *M. brunnescens*, Scl., but the lower part of the back, tail, and outer edges of the quills are rufous, as in *M squamigera*, but much deeper in color; it has a longer bill, with shorter wings and tail than *squamigera*, the spots are larger, duller, different in color, and not sharply defined as in that species.

Note.—Among the birds from Costa Rica belonging to the Smithsonian Institution, sent for examination by Prof. Baird, is a species of Margarornis which seems to be much like *brunnescens*, Scl.; it is of the same dimensions and color, except that the color and character of the spots below are much as on *M. guttata*. Mr. Sclater, in comparing his species with *squamigera*, says: "the plumage of the two species below shows much similarity, but in the *brunnescens* the tear-like spots are yellowish." In the specimen before me the spots are not much like those of *squamigera*, being not so clearly defined and with the throat are of a pale rufous color, whereas in *squamigera* the throat and spots are of a clear pale yellow, the latter surrounded with deep black. The Costa Rica specimen has the back brown tinged with rufous, and the tail of a deep rich brown nearly black. I found a specimen of the same species (not labelled) in the Museum of the Philadelphia Academy, which came from Ecuador. This has the back of a much brighter rufous, as also the throat and spots below. I think there is a possibility of its being different from *brunnescens*, and should it so prove, propose to distinguish it by the name of *brunneicauda*.

FAM. FORMICARIDÆ.

6. **Dysithamnus striaticeps**, nov. sp.

Male. Entire crown, occiput, and sides of the head clear greyish cinereous, each feather with a broad stripe of black down its centre; back and upper tail coverts of a dark uniform olive green; tail brownish olive; bend of shoulder white, wing coverts black, each feather marked at the end with a roundish white spot; quills blackish brown, edged on the breast with whitish margins; middle of abdomen reddish fulvous; bill and legs as in the male.

Habitat.—Costa Rica, Angostura. Collected by J. Carmiol. Mus. Smith. Inst.

Remarks.—This species somewhat resembles *D. semicinereus*, but is browner above, has a much larger bill, and in its striated head seems to differ from that and all others of the genus.

7. **Disythamnus rufiventris**, nov. sp.

Male. Upper plumage of a dull brownish olive, with a tinge of rufous, most so on the rump; front bluish cinereous; a concealed dorsal spot of pure white; tail olive brown; shoulders white, smaller wing coverts black, edged with white, middle and larger coverts reddish olive brown, narrowly margined with pale rufous; quills blackish brown, edged with reddish olive; under wing coverts and inner edges of quills pale salmon; chin and upper part of throat greyish white, with a dilute rufous tinge; sides of the head and lower part of the throat light bluish cinereous; breast and abdomen light rufous, brightest in the middle, sides olive brown; under tail coverts reddish brown; upper mandible black, the under whitish horn color; irides brown; feet dark fleshy brown.

Length $5\frac{1}{2}$ inches; wing $2\frac{1}{2}$; tail $2\frac{3}{8}$; bill $\frac{9}{16}$; tarsi $\frac{7}{8}$.

Habitat.—New Granada, line of Panama R. R.

Remarks.—In its rufous under plumage it differs from all other species of the same genus.

8. **Myrmotherula albigula**, nov. sp.

Male. Above olive brown, inclining to cinereous on the crown, and slightly tinged with rufous on the rump; it has a slight post-ocular stripe of dull white; tail blackish brown, edged with dull rufous; smaller wing coverts the same color as the back, the others dark brown ending with pale rufous; quills blackish brown, edged with reddish olive; under lining of wings and inner margins of quills pale cinnamon; throat white; sides of the neck, breast, abdomen, and inner tail coverts clear pale cinnamon; upper mandible black, the under whitish horn color; tarsi and toes plumbeous black.

Length 4 inches; wing 2; tail 1$\frac{5}{16}$; bill $\frac{7}{16}$; tarsi $\frac{5}{8}$.

Habitat.—New Granada, line of Panama R. R.

Remarks.—The female differs only in the color not being so clear below, and in the white of the throat having a slight tinge of cinnamon.

I have had for some time a female of this species, which I was, however, unable to determine. Recently I received another example, much the same in plumage, but with the color below purer and the throat whiter, the sex of which was not marked. This I have now described as the male,—it agrees with a specimen of the same species, marked as of that sex, which came with other birds belonging to the Smithsonian Institution, sent to me for examination by Prof. Baird; it was collected in Costa Rica by Julian Carmiol. This and the preceding species are included in my Catalogue of the Birds of Panama, but were undetermined.

Habitat.—Costa Rica, Angostura. Collected by J. Carmiol. Mus. Smith. Inst.

Remarks.—Allied to *M. exsul*, Scl., and *M. læmosticta*, Salv. (P. Z. S., 1864, p. 582); it differs from the former in having a white concealed dorsal patch, in the middle as well as the smaller wing coverts being black, and the spots on them larger and more conspicuous; the bill is much narrower than that of *exsul*; from *læmosticta* it differs in the throat being unspotted, the shoulders white, and the middle wing coverts black; it is also larger.

M. læmosticta differs from all its affines in having the throat spotted with white, and in its shoulders being black.

FAM. TYRANNIDÆ.

10. **Empidonax flavescens**, nov. sp.

Male. Plumage above greenish yellow, the crown darker, and of a brownish cast; tail umber brown, edged with the same color as the back; smaller wing coverts colored like the back, the others umber brown, margined at their ends with light fulvous, forming two bars across the wing; quills umber brown, narrowly edged with greenish yellow; under plumage bright yellow, the breast deeper in color and of a fulvous shade; the chin greyish; under wing coverts pale yellow; inner margins of quills of a light salmon color; upper mandible black, the under creamy white; feet light brown.

Length 5½ inches; wing 2⅝; tail 2¼; bill ⅜; tarsi ⅝.

Habitat.—Costa Rica, Barranca. Collected by J. Carmiol, April, 1864. Mus. Smith. Inst.

Another specimen, collected Nov. 30th (sex not marked), has the quill and tail feathers of a darker brown, the crown darker and richer in color, and the fulvous on the breast and wing coverts deeper and brighter.

This is not much like any other species of the genus.

11. **Contopus lugubris,** nov. sp.

Female. Upper plumage very dark olive brown, of a lighter color below, on the middle of the abdomen dull whitish fulvous; tail and quills blackish brown; the larger wing coverts and secondaries with pale edgings; under wing coverts and inner margins of quills dull pale ochreous; chin greyish; on the pleura a patch of white feathers; under tail coverts light olive brown, with pale ochraceous edges; upper mandible black, the under yellow; tarsi and toes reddish brown. Second and third quills equal and longest, the first shorter than the fourth.

Length 7 inches; wing 3⅝; tail 3⅛; bill ⅝; tarsi ½.

Habitat.—Costa Rica, Barranca. Collected by J. Carmiol. Mus. Smith. Inst.

Remarks.—This is a very sombre colored species, and a strictly typical form of the genus. In color it somewhat resembles *C. Richardsoni*, but is very much darker as well as larger.

12. **Eupherusa niveicauda,** nov. sp.

Male. Plumage both above and below grass green, on the under tail feathers extending over both webs; the tail feathers are narrower than those of *eximia*, and the dark band at the end of the tail is about half as wide as in that species.

XIII.—*Note on the Family of* MYLIOBATOIDS, *and on a New Species of* ÆTOBATIS.

By THEODORE GILL.

Read April 8, 1865.

THE family named *Myliobatides* by Müller and Henle, is an eminently natural and distinct group, but contains several genera, exhibiting characters of very unequal value, and which may be grouped into two tribes well distinguished by peculiarities of dentition. For their first separation, we are indebted to Prof. Agassiz.

The *Myliobatinæ* Ag. include only such species as have several longitudinal rows of angular interlocking teeth, with plane surfaces; *Myliobatis*, *Holorhinus*, *Rhinoptera*, and *Zygobatis* belong to it.*

Aetobatinæ Ag. have a single longitudinal row of transverse plane teeth, and the dental plane of the lower jaw is flat, more or less convex or angular at the middle, and projects far forwards. *Aetobatis* and *Goniobatis* have been named as genera.

Holorhinus is perhaps scarcely generically distinct from *Myliobatis*, although its ventral fins are much wider and rhomboid, while *Zygobatis* does not appear to be sufficiently distinct from *Rhinoptera*. *Myliobatis* and *Rhinoptera* are consequently alone adopted, and to them may perhaps be added two which have been hitherto confounded with *Rhinoptera*, but which seem entitled to distinction; they may be distinguished as follows:

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* I am unable to understand what the "genus *Trikeras*" of Harless (1850) is intended to embrace.

MYLIOBATINÆ (Bon.) Ag.

I.—Snout entire or convex in front.

a. Teeth of the middle row of nearly uniform width before and behind, three to six times as wide as long (adult); in young, teeth of the middle row rapidly diminish in width backwards, where they are little or no broader than long, fide *Harless.*
Myliobatis.[*]

II.—Snout emarginated in front.

1. Teeth gradually diminishing in width towards the sides.
Rhinoptera.

2. Teeth like *Myliobatis;* the middle very wide; the lateral little or no wider than long. Mylorhina.

3. Teeth of the middle in the *upper* jaw *narrower than the internal lateral;* lateral graduated towards sides.
Micromesus.

Myliobatis Dum.

Holorhinus Gill.

Rhinoptera Kuhl.

Zygobatis *Ag.*

MYLIOBATIS Dum.

§ Holorhinus Gill.

Myliobatis Californicus Gill.

Rhinoptera vespertilio *Girard.*
Holorhinus vespertilio *Gill.*

This species has not the slightest affinity to *Rhinoptera*, as may be at once perceived by reference to the figure published by Girard (Boston Jour., N. H., VI., 1857, p. 26). It only differs from the typical species of the genus by the narrower median teeth—which are about three times as wide as long—and by the wider rhomboid ventrals.

The *Myliobatis vespertilio* Bleeker, having been named previously (1851), the present species cannot retain the specific name originally conferred on it.

AETOBATIS M. H.

Ætobatis laticeps Gill.

The greatest width is rather *more* than twice as great as the distance from the snout to the front of anus. The head is rather broad and nearly equals the distance from the snout to the division between the nasal lobes. The snout is obtusely angulated in front, and at its sides is convex and scarcely angulated; its width, at the line of the front of the nostril, is as great as the distance from its point to the interlobular nasal emargination. The rostro-frontal fontanelle is constricted at its anterior third; the interval between the crests of the anterior portion enters about 2⅔ times in the interorbital area; at the constriction, about four times, and at the posterior portion, about 2⅔ times; the posterior portion *gradually expands* backwards and terminates with an oval contour behind. The nasal lobes are about twice as long as wide, their length externally exceeding half the length or breadth of the rostral area.

The dental plate has a triangular contour; its anterior angle is obtusely rounded.

The dorsal fin commences immediately behind the pectoral fins. The ventral fins (♀) are almost truncated behind, between the rounded angles; their breadth enters about 2½ times in the length. The tail is four or five times as long as the body.

The color is bluish-black above, relieved on the head by the numerous, but rather distant, whitish or yellowish spots, smaller than the eye, much larger on the body and behind towards the sides, and on the ventrals sometimes assuming the form of ocelli; below white; pectorals margined with blackish.

This species is closely related to *Ætobatis narinari* and its allies, and especially *Æ. latirostris* A. Dum, but is apparently distinguished by the combination of characters given in the diagnosis. It belongs to the genus *Goniobatis* Ag., proposed for species with a more angular lower dental plate than *Æt. narinari*, and is related to the *Goniobatis meleagris* Ag.,[*] of the Sandwich Islands, but is distinguished by the more declivous forehead, and the shape of the rostro-frontal fontanelle.

A single specimen was forwarded to the Smithsonian Institution by S. E. Hubbard, Esq., of San Francisco, California.

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flat, and the back and belly rounded; anus near the end of the anterior fourth of the length.

Lateral line a simple groove, high up and on the side of the back, not continued to the caudal.

Head oblong quadrate, transversely convex above and behind; the forehead slightly declivous, the snout projecting and convex in front, but obliquely truncated below and flattened towards the mouth; the sides compressed and the lower surface quite plane.

Eyes moderate, circular, intersecting the profile and mostly in the anterior half of the head. *Suborbital chain* complete, narrow in front, widest below, with its surface corrugated. Opercular apparatus complete; *preoperculum* very oblique; *operculum* high, nearly rectangulate-triangular, ending in the "opercular angle," and with the base or upper portion concealed under the skin by which it is attached to the shoulder; *interoperculum* moderate; *suboperculum* below and behind the operculum, and narrowed towards the angle of the latter.

Mouth inferior, in front of the eyes, with the cleft shallow, and the anterior or dentigerous margin of the jaws *transverse* and *perfectly straight;* *jaws* above immovable and undistinguishable without dissection; lower jaw nearly flat and very wide, expanded and thinner towards the front, which is perfectly rectilinear transversely. Gape very wide, the lower jaw, which, when closed, shuts obliquely upwards, being capable of retraction even behind the vertical. Intramaxillar veil well developed. *Tongue* small, far within the mouth.

Teeth only on the transverse portion of the jaws, uniserial, inserted on the external surface, sigmoidally curved, chiefly compressed transversely to the jaws, but with the tips projecting beyond the edge, compressed even with the jaws and forming a continuous incisorial edge; in the lower jaw, on each side of the series of small teeth, a very large curved canine is developed, which is received in a preocular fossa of the palate.

Branchial apertures minute, placed far up behind the operculum.

Branchiostegal rays six, well developed, the outer laminar.

Dorsal fin continuous from nape above preoperculum nearly to the caudal fin, with its anterior rays slender, inarticulated spines, and its posterior simply articulated rays.

Anal fin continuous from the anal region nearly to the caudal.

Caudal well developed, oblong, emarginated, with its rays simply articulated, and with an external elongated one above and below.

Pectoral fins low, angular, with the rays slender and simply articulated, and the connecting membrane thin and not notched.

Ventral fins, obsolete.

Such is the combination of characters which distinguishes this remarkable genus. The result of its examination assures the certainty that the genus is related to the Blennioids, but the peculiar modification of the oral apparatus, the elongated body, and the absence of ventral fins, indicate that it does not belong to the same family, but must be regarded as the representative of one nearly allied to it. To it, however, the *Nemophis Lessoni* Kaup may possibly be referred.

The genus *Nemophis** was proposed by Kaup for the reception of a fish discovered by Lesson and Garnot, on the Expedition of Duperrey, and was regarded as forming "a distinct group among the Riband-shaped Fishes," and as "perhaps the type of a different family which we may call *Nemophidæ*." If by the "Riband-shaped fishes" the *Cepolidæ*, *Trachypteridæ*, *Lophotidæ*, or any other allied types are meant, this view head forms rather more than an eleventh of the length, and is twice as long as high. The length of the snout to the diameter of the eye is about equal, and exceeds a fourth of the head's length. The length of the pectoral fin exceeds a seventh of the length. The well developed caudal has a lunate emargination, and its inner rays exceed a twelfth of the length, while the largest external ones exceed a sixth.

The color is purplish, uniform on the body, while the dorsal is darker and furnished with several rows of blackish dots; the caudal has two dark dots near the base, from the upper of which a streak advances forwards; the pectoral, externally, has a single dark dot near the base of the upper rays.

A single specimen, five inches and a half long, was found in the Chinese seas by Dr. William Stimpson, during the voyage of the North Pacific Exploring Expedition.

XV.—*On a New Family Type of Fishes related to the* BLENNIOIDS.

BY THEODORE GILL.

Read April 8, 1865.

FAM. CHÆNOPSIDÆ.

Genus Chænopsis, Poey.

Body naked, compressed, almost anguilliform, with the back and abdomen obtuse; very gradually decreasing in height to the caudal fin. *Anus*, submedian.

Lateral line, a simple furrow running nearly along the middle of the side.

Head much elongated, quadrate behind at the opercular region, conic in front, with the profile rectilinear and the snout acute.

Eyes moderate, circular, partly in the anterior third of the head. *Suborbital* chain well developed, perfectly ossified; preorbital triangular, pointed in front; portion under the eye narrow; behind, especially at the lower angle, enlarged.

Preoperculum produced backwards and rounded, *operculum* narrow oblong; *interoperculum* narrow, mostly concealed under the preoperculum; *suboperculum* of nearly uniform width curved, and chiefly behind the operculum. The opercular elements are situated high up, and leave exposed to view the branchiostegal membrane and its rays, which are continued upwards and curved inwards towards the scapular region; when appressed to the sides, a foramen is formed in front.

Mouth large, with the cleft nearly horizontal, linear, continued behind the eyes. Jaws not protractile, the lower slightly projecting. *Intermaxillaries* almost united by their posterior processes, and with their lateral continued to the eye; *supramaxillaries* narrow membranaceous. *Lips* obsolete.

Teeth, on the *intermaxillaries* and lower jaw, subcylindrical and blunt, and in a uniform row, behind which, in front, there is a broad band of villiform ones on the palatine bones, uniserial and obtusely subcylindrical like those of the jaws; the palatine rows are parallel; vomer edentulous.

Branchial membrane enlarged, conspicuous externally, confluent and emarginated behind beneath, and free from the throat.

Branchiostegal rays seven, very slender, elongated, and curved upwards and inwards behind the opercular apparatus.

Dorsal continuous from the nape, above the posterior margin of the mouth. The family appears to be most nearly related to the Blennioids, with which it essentially agrees in the structure of the fins, and even in the development of the branchiostegal rays and their exposure; it only differs in degree from those fishes, but the more elongated body and the peculiar modification of the head at once distinguish it; no anal papilla is developed, at least in the single specimen examined, nor is it probable that it is present in either sex. The whole structure is firm and compact, and presents a considerable contrast to the flabby appearance characteristic of the Blennioids.*

Chænopsis ocellatus, Poey Ms.

The height is contained about 20 times in the total length; the head about 4¼; the diameter of the eyes equals or exceeds an eighth of the head's length, is distant about 2½ diameters from the snout, and its posterior margin is rather nearer the angle of the preoperculum than the snout. The height of the dorsal fin in front equals about half the length of the head; the length of the pectoral is contained between 10 and 11 times in the total, and the caudal enters between 16 and 17 times in the length.

D. xviii. 38. A. ii. 38. C. 15. P. 12. V. 2–3.

The color is greenish purple; the dorsal at its anterior angle has an orange ocellated spot.

A single specimen 4¾ inches long was obtained by Prof. Poey at Matanzas, and kindly forwarded for my examination.

With the *Chænopsis* a small specimen of *Callionymus*† was received, which is of especial interest, it being the first of the genus that has been noticed as found in American waters. It belongs to *Callionymus* as restricted by myself, but is distinguished by the small number of dorsal and anal rays (D. III. 6, A. 4.) The preopercular spine is armed with three teeth above and terminates behind in an acute point. The species may be named *Callionymus pauciradiatus.*

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* I exclude from the Blennioids the genus *Murænoides* and its allies, and have constituted for them a peculiar family—*Xiphidiontidæ*.

† *Callionymus* has been restricted to species with a single lateral line, branchial apertures on the sides of the nape, and perfect ventral fins. The *C. goramensis* Blkr. may be regarded as a distinct type (*Diplogrammus*), distinguished by the double lateral line. *Synchiropus* and *Dactylopus* are excellent genera, and the last has been adopted under the name *Vulsus*, the change of name having been made on account of the existence of the term *Dactylopoda*, given by Von Meyer to a group of reptiles, as I have been kindly informed by the author of the change. Such extreme views would necessitate very numerous changes in the nomenclature, and are not recognized by naturalists generally.

XVI.—*Note on Certain* INSECT LARVA-SACS, *described as Species of* VALVATÆ.

BY THOMAS BLAND.

Read April 3d, 1865.

SOME years ago I collected in the Island of Jamaica, W. I., from a stream of fresh water, small objects like spiral univalve shells, which I supposed to be mollusks, but after examination and inquiry discovered my error.

Subsequently I learned that an object of similar character had been described by Mr. Isaac Lea as *Valvata arenifera,* In the summer of 1862, I received from Mr. Henry Rousseau a number of these larva-cases, collected by him in the vicinity of Troy, N. Y. The specimens were in alcohol, but at my request Mr. Rousseau sent to me living ones, which I placed in a small aquarium, wishing to observe their habits and destiny. During the following autumn and winter the larvæ were extremely active, creeping about on the stones and feeding apparently on confervæ. If disturbed, the larva withdrew into its abode, which then seemed to be somewhat firmly fastened or secured to the object on which the case happened to rest.

Early in the spring of 1863, I noticed what appeared to be the *exuviæ* of the *nympha* of an insect floating on the surface of the water in the aquarium, and empty larva-cases at the bottom. Suspecting that some of the insects had flown, I placed a gauze net over the aquarium, and in a few days obtained several perfect *imagines.* Believing that these would be very interesting to naturalists, I consulted Mr. Akhurst, and at his suggestion forwarded the insects and cases to Mr. P. R. Uhler, who reported that they probably belonged to the genus *Helicopsyche* of the family *Hydropsychidæ*, and that the species was perhaps new. He sent the specimens to Europe for determination by Dr. Hagen, but I have not at present heard the result.

In a paper entitled "Descriptions of New Species of Fluviatile and Terrestrial Operculate Mollusca from Trinidad" (*Ann. and Mag. of Nat. Hist.*, No. 82, Oct., 1864) by Mr. R. J. Lechmere Guppy, is the following description, evidently of a *Helicopsyche*-sac, but treated by the author as a Valvata.

"*Valvata agglutinans.*—Shell trochiform-depressed, perforate, entirely composed of numerous minute grains of mineral matter; whorls 3-4, almost carinate, flattened beneath; umbilicus circular; aperture very oblique, circular, the margins shortly united on the penultimate whorl; peristome simple, irregular. Height 0.1 inch, greatest breadth 0.17 inch.

"It lives on the surface of rocks and stones in the hill streams of the northern part of Trinidad."

Tryon (*Amer. Journ. of Conchology*, Part I., February, 1865) justly remarks:—"This fresh description of *Phryganiæ* as *Valvatæ* is amusing; naturalists seem resolved to consider them Mollusca!"

As these *Helicopsyche*-sacs have from time to time attracted much attention, and their true character has been misapprehended, I add a copy of an interesting note on the subject from Von Siebold's work *On a true Parthenogenesis in Moths and Bees* (English translation by W. S. Dallas, pp. 28–30. London, 1857).

"Besides *Psyche Helix*, there are some other insects whose larvæ, as case-bearers, manufacture sacs in the form of a snail-shell. In the genus *Psyche* itself there occurs another species, the caterpillars of which, like those of *Psyche Helix*, bear about with them a spirally-twisted sac. By the kindness of Herr Zeller of Glogau, and Dr. Rosenhauer of Erlangen, I possess two earth-colored, snail-like sacs, with perfectly flat convolutions (Figs. 15–17), found in Sicily and Spain. They are nearly three times as large as the sacs of *Psyche Helix*, and from their different form and size belong to another species, to which I will give the provisional name of *Psyche Planorbis*. Both sacs, like those of *Psyche Helix*, are covered with fine grains of earth and sand cemented spirally convoluted, membranous operculum. The general form, as well as the dimensions, remind one strikingly of the *Valvata depressa* Pfr. In all the individuals provided with an operculum, there was either the larva or the nympha of an insect, probably belonging to the genus *Phryganea*, which, bent into a half-spiral, lay singly in each shell. Under the microscope the opercula exhibited, besides the spiral or regularly concentric structure above referred to, an excentric longitudinal opening, running parallel to the inner margin. Specimens of the *Valvata arenifera* of Lea, which I have recently obtained from Vienna, exhibit precisely the same structure both of the shell and operculum. In Réaumur's *Mémoires pour servir à l'Histoire des Insectes*, tom. iii, p. 193, pl. 15, Figs. 22–24, there is a short description and figure of a (spirally convoluted) *Phryganea*-case (occurring in Switzerland). This species of Réaumur's, however, differs in every other particular from the species above described, and also appears to possess no operculum.'

"The case last referred to by Shuttleworth belongs to *Psyche Helix;* the other one, which resembles a *Valvata*, on the contrary, is a very different thing (see my figures 18–22), and is certainly produced by a Phryganidous insect. I saw several of the habitations of this insect in Bremi's collection at Zurich, partly collected in Corsica and partly on the Lake of Como. Bremi has given the name of *Helicopsyche Shuttleworthi* to the questionable Phryganidan from which these spiral cases are derived; and many specimens of a similar smaller case have been since sent to him from a brook in Porto Rico, the inhabitant of which Bremi has named *Helicopsyche minima.* By the kindness of Herr Bremi I have obtained several specimens of both kinds, which are essentially different in their structure from the sacs of *Psyche Helix.* As regards their size, the diameter of the largest sacs of *Helicopsyche Shuttleworthi* is 2 lines (Rhenish), and of those of *H. minima* 1 line. A principal distinction between these Phryganidan domiciles and the spiral sacs of *Psyche* consists in the fact, that whilst in the case of *Psyche Helix* extremely fine grains of sand are stuck as a coating upon the outer surface of the white web of the sac-walls, in *Helicopsyche* the walls of the habitation are formed directly and solely of larger, polygonal particles of sand, closely cemented together from within and without. The caterpillars of *Psyche* also never close their sacs with an operculum. But that the *Helicopsyche*-sacs are really produced by a Phryganidous insect, I ascertained from the contents which I extracted from two cases of *Helicopsyche minima* still furnished with opercula. These consisted of a dried pupa, which in the form of the legs and of the long antennæ, the four hairy rudiments of wings, and the two biting jaws, exactly resembled a *Phryganidan*. The description given by Lea of his *Valvata arenifera* (in his *Observations on Najades and Descriptions of New Species, vid. Trans. of the Amer. Phil. Soc.* vol. iv. Philadelphia, 1834, p. 104, pl. 15, Fig. 36, *a*, *b*. See my copies, Figs. 23, 24) runs as follows: 'Testa orbiculata, convexa; anfractibus tribus, qui arenis agglutinatis operiuntur; umbilico lato; spira obtusa.' *Hab.*—Cumberland River, near Nashville. Length four-twentieths of an inch. *Remarks.*—This very curious and interesting species was among the freshwater shells so disinterestedly sent to me by the Lyceum of Natural History of New York, to be examined and inserted in this paper. It has the singular property of strengthening its whorls by the agglutination of particles of sand, &c., by which it is entirely covered, and in this character it resembles *Trochus agglutinans* Lam. (*T. conchyliophorus*, Authors). The apex, in all the specimens which I have had an opportunity of examining, is broken. The operculum was observed in two specimens sufficiently perfect to exhibit a striated horny structure.'

Helicopsyche Shuttleworthi I perceived no opercula; they had probably fallen off, or perhaps were not formed when these sacs were collected."

Von Siebold gives figures (referred to in the note above quoted) of the caterpillar-sacs of *Psyche Helix* and *Psyche Planorbis*, of the sac of *Helicopsyche Shuttleworthi* and of *Valvata arenifera*, enlarged and copied from Lea. To the "Explanation of the figures" Von Siebold adds the following supplementary observation:—

"At my last visit to Zurich I saw in Bremi's collection the cases of a third larger species of *Helicopsyche*, which Bremi obtained from Shuttleworth, and has named *Helicopsyche Colombiensis*. These cases come from Puerto-Caballo; they have a transverse diameter of $1\frac{8}{10}$ lin., and a height of $1\frac{2}{10}$ lin. Rhenish, and are manufactured out of comparatively very coarse, rusty-brown stones. With regard to *Helicopsyche Shuttleworthi*, Bremi informed me, that the cases of this Phryganidous insect have now been found also on the Lake of Geneva."

The cases received from Mr. Rousseau, and from Canada, are in size, form, and construction somewhat similar to those figured by Von Siebold as *Helicopsyche Shuttleworthi*. In the operculum of the Troy specimens there is the longitudinal opening described by Shuttleworth.

XVII.—*Notice of a* POST-PLEIOCENE *Deposit on* GARDINER'S ISLAND, SUFFOLK CO., N.Y.

By SANDERSON SMITH.

Read May 1, 1865.

THIS deposit was visited by me three or four years ago, but as I was able to spend only about twenty minutes at the locality, I have hitherto refrained from publishing my account of it, hoping to have an opportunity to investigate it more thoroughly, which, however, I have not yet done. As it appears to be richer in species than any locality hitherto described between North Carolina and the St. Lawrence, even a partial list of the fossils may be interesting.

It is situated on the eastern shore of the Island, near the southern extremity of the high land, and about fifteen or twenty feet above the sea-level. The thickness of the bed it is somewhat difficult to state exactly, as the breaking down of the bank causes the shells to cover the surface of the bluff down to the beach. It is probably four or five feet, however, and the length appeared to be about 150 to 200 feet, the bed thinning out at each end. It is composed mainly of sand and fine gravel, with few large pebbles only, so far as I recollect. The species found number 25, but careful examination would probably considerably increase this number.

1. **Nassa trivittata Say.**
2. **Nassa vibex Say; fragment only, but, I think, undoubtedly of this species.**

10. **Crepidula fornicata Lam., one very small specimen.**
11. **Tornatella punctostriata Adams? ? . I have a distinct recollection of**

18. Cardita borealis Conrad. Abundant.
19. Astarte sulcata Fleming. Abundant.
20. Venus mercenaria Linn. Of very large size and excessively thick and heavy. This species constitutes the bulk of the deposit. The shells are all broken but not rolled, the fractured edges being still perfectly sharp in most cases.
21. Lucina radula Gould? A small fragment, not showing the hinge, but exceedingly well-preserved.
22. Mactra lateralis Say. Small but abundant.
23. Mya arenaria Linn. Fragments of very large size are very abundant.
24. A small coral.
25. Fragments of a Balanus.

In the determination of most of these species I had the advantage of the opinion of the late Mr. Wm. Cooper. With the exception of *Fusus decemcostatus* and perhaps *Lucina radula*, they are all still inhabitants of the neighboring waters, south of Cape Cod; but still the group as a whole seems to have a more northern aspect than the group of species at present inhabiting those waters, contrary to the conclusions drawn by Mr. Desor from lists of *Post-Pleiocene* fossils obtained by Mr. Conrad at the mouth of the Potomac, by Mr. Stimpson at Point Shirley (Boston Harbor), and by himself at Sancoti Head (Nantucket). (See *Sill. Journ.*, July 1852, p. 53.)

NOTE.—It is not impossible that several of the species dredged in the waters of Peconic and Gardiner's Bays (see *Ann. Lyc.*, vol. vii., April, 1860), such as *Astarte mactracea*, *Corbula contracta*, and *Cumingia tellinoides*, of the first two of which no living specimen, and of the last only a single one has been found by me, although all are abundant in very deep dredging, may be derived from submarine deposits of this character, instead of belonging to the recent fauna of the Bays.

XVIII.—*Catalogue of the* MOLLUSCA *of* STATEN ISLAND, N. Y.

By J. W. HUBBARD, M.D., and SANDERSON SMITH.

Read May 1, 1865.

[The character * indicates that the species is abundant; † that it is scarce. To several, especially among the fresh-water shells, which have been but imperfectly examined, no mark is prefixed.]

*Ranella caudata Say.
*Pyrula carica Brug.
*Pyrula canaliculata Brug.
*Buccinum plicosum Menke.
*Nassa obsoleta Say.
*N. trivittata Say.

†N. vibex Say.
*Columbella avara Say.
*Col. lunata Sowerby.
†Pleurotoma cerinum Kurtz and Stimpson.
†Natica heros Say.
*N. duplicata Say.
†N. pusilla Say non Gould.
*Chemnitzia seminuda Stimpson.
*C. bisuturalis Stimpson.
*C. trifida Stimpson.
*C. interrupta Stimpson.
†Scalaria lineata Say.
*Cerithium Sayi Menke.
*C. nigrocinctum Adams.
†C. Greenii Adams.
*Littorina rudis Gould.
*L. littoralis Forbes and Hanley.
*Lacuna vincta Turton.
*Rissoa minuta Stimpson.
*Crepidula unguiformis Lam.
*C. convexa Say.
*C. fornicata Lam.
†Acteon punctostriata Stimpson.
†Bulla solitaria Say.
canaliculata Gould.

*Venus mercenaria Linn.
†Venus notata Say.
*Venus gemma Totten.
*Cytherea convexa Say.
*Petricola dactylus Say.
*P. pholadiformis Lamarck.
*Mactra lateralis Say.
*M. solidissima Chemnitz.
†M. similis Say ?
†Kellia planulata Stimpson.
*Tellina fusca Phil.
*T. tenera Say.
†T. tenta Say.
†Cumingia tellinoides Conrad.
*Solen ensis Linn.
*Solecurtus Caribæus Conrad.
*Mya arenaria Linn.
*Cochlodesma Leanum Couthouy.
*Lyonsia hyalina Conrad.
*Pandora trilineata Say.
†Pholas truncata Say.
*P. crispata Linn.
†Martesia (Diplothyra) Smithii Tr
*Teredo dilatata Stimpson.
Sphærium securis Prime.
Sphærium partumeium Say.
*Pisidium abditum Hald.
fluviatilis Lea ?

*H. thyroides Say.
*H. tridentata Say.
†H. hirsuta Say.
*H. pulchella Müll.
*H. labyrinthica Say.
*H. alternata Say.
*H. striatella Anth.
*H. minuscula ? Binney.
*H. arborea Say.
*H. electrina Gould.
†H. indentata Say.
†H. chersina Say.
†H. suppressa Say.
*H. lineata Say.
*Succinea avara Say.
*S. aurea Lea.
*S. ovalis Gould non Say.
S. obliqua ? Say.
S. ?
†Tebennophorus Caroliniensis Binn.
*Limax agrestis Linn.
†Limax campestris ? Binn.
*Melampus bidentatus Say.
*Alexia myosotis Drap.
†Carychium exiguum Say.

Notes by Sanderson Smith.

Pecten irradians is exceedingly scarce on Staten Island, notwithstanding its abundance on other parts of our coast, south and east.

The same may be said of *Cardium Mortoni*, of which, indeed, the occurrence on Staten Island is still doubtful.

The shell marked as *Cardita borealis?* is about one-eighth of an inch in diameter, and neither the late Mr. Wm. Cooper nor myself could find any essential difference from the young of that species. As, however, the same species occurs both at Greenport and Huntington, Long Island, of the same size only, and in all these cases, in localities where the adult shell has never been found, it seems possible that it may prove to be different.

Mya arenaria was once found by Mr. Wm. Cooper and myself imbedded in numbers in a large log of wood, in holes a foot deep and half an inch in diameter, each of which contained from five to ten specimens. As the shells were nearly as wide as the holes in which they were contained, and as in most cases the holes, though near the surface of the log, had no apparent connection with the exterior except at their mouths, it seems difficult to conceive how the shells at the bottom of the holes could support existence. Nearly all, however, still had the animal in them. They were taken at first for specimens of *Saxicava*, which they greatly resemble. The ordinary varieties of this species are abundant on the Island.

Martesia Smithii. An oyster shell dredged somewhere around Staten Island contained a specimen of this shell with the fresh animal, showing that whether an imported species or not, it is at present living on our shores.

Of *Pupa rupicola* only two specimens have been found.

Helix striatella and *H. suppressa* have hitherto been found in one locality only for each, but the first-named is there somewhat abundant. Of *H. hirsuta* one specimen only has occurred, near New Brighton, on the north shore of the Island. *H. chersina* is scarce, not more than a dozen specimens having been found. *H. labyrinthica* is exceedingly abundant in one locality.

Succinea aurea is plentiful on the salt marshes.

Of *Tebennophorus Caroliniensis* I have found only one specimen, at New Brighton.

The list here given is probably by no means complete, especially as to the fresh-water shells, and some of the marine species living in deep water. Our dredgings have been but

XIX.—*Notes on certain* Terrestrial Mollusca, *with Descriptions of* New Species.

By Thomas Bland.

Read September 25, 1865.

In a note accompanying my description of *Proserpina Swifti* from Venezuela (*Ann.* viii. 13, 1863), I gave the characters of the Family Proserpinacea from Gray's "*Guide to the Mollusca*," and of the Genera Ceres and Proserpina; indicating also the number of parietal and palatal laminæ in each of the species. I added the following remarks:

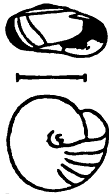
"It will be noticed that the existence of one or more parietal or palatal teeth, in addition to the fold or tooth on the columella, is given as a characteristic of the Family.

"The recent discovery, however, of the species described in this paper as *P, Swifti*, having the columellar fold only, shows that it alone, so far as the teeth are concerned, is a constant character.

"*P. Swifti* does not properly belong to Proserpina as defined by authors; but as that genus embraces species with and without palatal teeth, it may fairly be enlarged so as to include those with and without parietal teeth, all having the columellar fold characteristic of the family."

On a late examination of some terrestrial shells collected by Dr. Berendt in Mexico, I was surprised to find a species with a slightly elevated parietal lamina, but *no columellar fold*, and yet having externally the appearance of a Proserpina. On opening several examples, I discovered that the septa of the whorls were destroyed, as in the Family Proserpinacea, to which I concluded that it belongs.

Fig. 1.



P. Swifti Bland.

P. Swifti, of which figures are annexed, afforded proof that the parietal and palatal laminæ can no longer be regarded as Family characters, and it is now shown that the columellar fold is not constant.

Under these circumstances, I propose to remodel the descriptions of the Family Proserpinacea and Genera hitherto comprised in it, and to place the Mexican shell above referred to, under the specific name *Berendti*, in the new genus Proserpinella.

Fam. PROSERPINACEA.

T. imperforata, helicinæformis, basi modo vel etiam superne callo nitido obducta; sepimenta interna ad modum Helicinaceorum sensim et regulariter resorpta. Operculum nullum.

I. Ceres Gray.

T. carinata, superne rugosa, epidermide tenui obducta, basi callo nitido munita; columella unidentata; utrinque lamellifera; perist. rectum, subincrassatum.

1. *C. eolina Duclos.* 2. *C. Salleana Cuming.*

II. Proserpina Gray.

T. globosa vel depressa, lævigata, utrinque plus minusve callo nitido

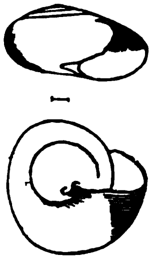
III. Proserpinella, nov. gen.

T. depressa, lævigata, utrinque callo nitido obducta; paries aperturalis lamina 1 munitus; apertura lunaris; perist. simplex, rectum.

Proserpinella Berendti, nov. sp.

T. depressa, tenuis, nitida, albida; spira brevissime elevata; sutura vix impressa, submarginata; anfr. 4, sensim accrescentes, ultimus latior, convexiusculus, basi convexior, juxta columellam excavatus; apertura parum obliqua, lunaris, unidentata, dente lamelliformi vix prominente intrante in pariete aperturali; perist. simplex, rectum.

Fig. 2.



Proserpinella Berendti Bland.

Shell depressed, thin, shining, white; spire very little elevated; suture scarcely impressed, submarginate; whorls 4, gradually increasing, the last broader, rather convex, more convex at the base, excavated near the columella; aperture oblique, lunate, with 1 little elevated lamelliform tooth on the parietal wall; perist. simple, straight.

Diam. maj. 2–3; min. 2½; alt. 1½ mill.

Habitat.—Mirador, Atlantic slope, 3000 to 4000 feet elevation, Mexico. Dr. Berendt!

Remarks.—This species is most nearly allied in form to *Proserpina depressa* Orb., or a small example of *P. nitida* Sowb., but it is readily distinguished from them by its slightly developed parietal lamina and the absence of the columellar fold.

———o———

Stenopus? Guildingi, nov. sp.

T. perforata, depressa, tenuis, subtilissime striatula, nitida, diaphana, corneo-succinea; spira planiuscula; anfr. 4 celeriter accrescentes, vix

convexiusculi, ad suturam leviter impressam breviter striato-marginatæ, ultimus latior, non descendens; apertura fere verticalis, lunato-rotundata; perist. simplex, acutum, margine columellari vix reflexiusculo.

Shell perforate, depressed, thin, minutely striatulate, shining, diaphanous, horny-amber; spire nearly level; whorls 4, rapidly increasing, scarcely convex, with shortly striated margin at the lightly impressed suture, the last wider, not descending; aperture almost vertical, lunate-rounded; peristome simple, acute, the columellar margin scarcely reflexed.

Diam. maj. 8; min. 7; alt. 3 mill.

Habitat.—Porto Cabello, Venezuela. Robert Swift.

Remarks.—I received one specimen of this interesting species, with the animal, from Mr. Robert Swift, and submitted it to Edward S. Morse for microscopic examination, and to him I am indebted for the accompanying figures and the substance of the subjoined notes.

FIG. 3.

inferior tentacles; but doubtless they exist, and would be perceptible in the living animal.

c. Tail magnified, showing the (retractile?) appendage, at the base of which the mucous pore was noticed,—the creeping disk remarkably narrow and long.

d. Section of lingual membrane; about 85 rows of plates, 44–1–44, central plate long, narrow, with a single pointed denticle, slightly indented at the base; laterals and uncini similar, having a single long recurved denticle. The dentition somewhat similar to that of *H. concava Say* (*Morse Terr. Pul. of Maine, pl.* 5), but the plates longer and narrower.

e. Buccal plate, arcuate, roundly produced in the centre of the cutting edge, in form like that in Helicellinæ.

The character of the animal induces me to believe that this species belongs to Stenopus, of which Guilding (*Zool. Jour.* iii. 527, 1828) describes the pedal disk and tail as follows:—"*Discus gressorius* distinctus, linearis, musculis transversis, pedis lateribus multo angustior, veluti in genere Onchidio (unde nomen). *Cauda* tentaculata, tentaculo subretractali, *glandulâ* ad basin positâ."

He adds this remark: "A very remarkable and distinct genus allied to the Linnean Helices, from all of which it differs in the curious contraction of the pedal disk, and the caudal tentaculum furnished with a gland beneath. They creep slowly and awkwardly, not being able to support the shell, on account of the narrowness of the foot, without proceeding in a meandering line."

The shell under consideration may in several respects be compared with *Stenopus cruentatus* Guild.; the most marked differences are, that the latter is transversely plicatulate and impressed round the perforation.

———o———

In a paper "On the Structure of the Axis of the Shell of Cylindrella" (*Annals* vi. 150, 1855), I pointed out the peculiar nature of the axis in several species, and observations have since been made on its singular character in other and especially in Cuban species.

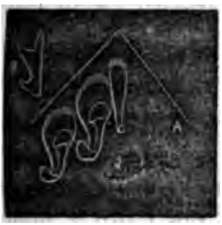
In *C. turris* Pfr. of Mexico, the axis is a highly polished tube, the exterior of which is distantly but strongly ribbed, having a diameter, in the fourth whorl from the last, of 4–5 mill., so that a young shell must have a wide open umbilicus. This tube has a groove or sinus within each whorl, immediately above the septum. The tube gradually increases in size from the apex, but is smaller towards the base; in the penultimate whorl it is 3 mill. in diameter; in the last it rapidly diminishes, and terminates in a point, the umbilicus being imperforate. A similar structure prevails in *C. clava* Pfr., also from Mexico.

The internal structure of *C. Goldfussi* Menke of Texas, belonging to the subgenus Holospira, differs essentially from that of any West Indian form which has come under my notice, and I have examined very many.

In the penultimate whorl of *C. Goldfussi* there are four

The forms of the central plate and laterals of *C. scæva* Gund. of Cuba, obtained from a living example received from Mr. Charles Wright, are shown in the annexed figure, which, with several others illustrating this paper, I use with the kind permission of Professor Henry of the Smithsonian Institution, in anticipation of a forthcoming work prepared for the Institution by W. G. Binney.

Fig. 4.



Lingual Dentition of Cylindrella scæva Gund.

The rows are about 130 in number, the formula being 26–1–26. The central plate is small, obtusely pointed, laterals uncinated, joined two by two, upper edge fringed.

C. scæva belongs to the subgenus Urocoptis.

The classification by Albers (*Die Heliceen*, 1861) of Cylindrella and Macroceramus, may here be added for convenient reference, but I do not desire it to be implied that I adopt his views:

CYLINDRELLA.

Urocoptis Beck.	Type C. decollata Nyst.
Mychostoma Albers.	" C. subula Fer.
Gongylostoma "	" C. elegans Pfr.
Holospira "	" C. pilocerei Pfr.
Trachelia Pfr.	" C. porrecta Gould.
Diaphora Albers.	" C. Cumingiana Pfr.
Scalatella "	" C. Greyana C. B. Ad.*
Casta "	" C. Chemnitziana Fer. (elongata Chem.)

MACROCERAMUS.

Macroceramus Guild.	Type M. signatus Guild.
Anoma Albers.	" M. tricolor Pfr.
Lia.	" M. Maugeri Wood.

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* C. B. Adams described this originally as a Cylindrella, subsequently as a Geomelania, finding it to be operculated. Pfeiffer (*Mon.* iii., 1865) has it in Truncatella.

The genus Macroceramus belongs to the West Indian fauna, and has its greatest development in Cuba and Haiti.

Pfeiffer remarks that Macroceramus has affinities with Bulimus, Pupa, and Cylindrella, but especially with the latter; it is, however, noticeable that the buccal plate is not found in the animal of that genus, while it exists in Macroceramus.

Mr. Robert Swift lately sent to me (mounted for microscopic examination), the buccal plate and lingual membrane of ***Macroceramus signatus*** Guild. of Tortola, and of the lingual membrane of the same species from Anguilla, from which I annex figures drawn by Morse.

FIG. 5.

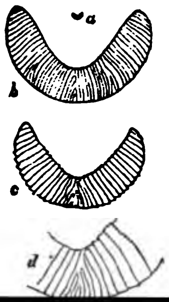
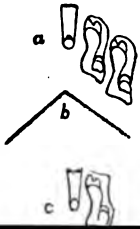


FIG. 6.



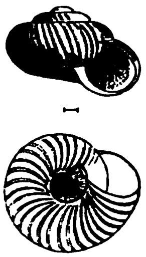
Central plate narrow, with one small, obtuse tooth. Laterals with one prominent tooth supporting two denticles and a small one at the base.

The axis of the shell of Macroceramus in all the species which I have examined, with one exception, is simple as in Bulimus, or has a scarcely perceptible twist. In *M. amplus* Gund. of Cuba, one well-defined lamella revolves on the axis within the lower whorls, becoming partially obsolete in the last. Pfeiffer (*Mon.* iv. 689) adds to the description of this species the following note: "Habitu Cylindrellis nonnullus persimilis, attamen characteribus aperturæ a *M. Kieneri*, *Gossei*, &c., non separandus." In the two species referred to by Pfeiffer there is no internal lamella. Examination of the animal of *M. amplus* may show that it belongs to Cylindrella.

Considering their general characters and forms of aperture, may not *Bulimus* (*Pineria*) *Beathinus* and *terebra* Poey of Cuba, and *B. Viequensis* Pfr. of Viéque and Barbados, be placed, as the two former are by H. and A. Adams, in Macroceramus?

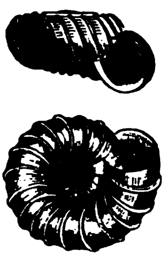
Helix conspecta, nov. sp.

Fig. 7.



Helix conspecta Bland.

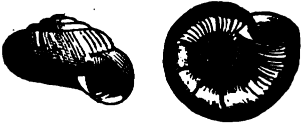
Fig. 8.



H. asteriscus Morse.

T. umbilicata, subdepressa, tenuis, oblique subdistanter costulato-striata, intervallis sub lente striatulis, fusco-cornea; spira convexa, apice obtusa, levi; sutura profunda; anfr. 4 convexi, lente accrescentes, ultimus latior, rotundatus, antice vix descendens; umbilicus $\frac{2}{7}$ diametri fere æquans; apertura obliqua, rotundato-lunaris; perist. simplex, rectum, marginibus subconniventibus, columellari superne vix dilatato.

FIG. 9.



H. Mazatlanica Pfr.

Shell umbilicate, subdepressed, thin, with oblique, rather distant rib-like striæ, the interspaces microscopically striate, dark horn colored; spire convex, with smooth, obtuse apex; suture deep; whorls 4, convex, gradually increasing, the last broader, rounded, slightly descending above; umbilicus about equal to $\frac{2}{7}$ the diameter of the shell; aperture oblique, roundly lunate; perist. simple, straight, the margins approaching, the columellar margin scarcely dilated.

Diam. maj. 2; min. $1\frac{3}{4}$; alt. 1 mill.

Habitat.—San Francisco, California. Rowell!

Remarks.—This small species is allied to *H. asteriscus* Morse,

Helix sportella, Gould.

In a paper on land and fresh-water shells collected by Dr. J. G. Cooper in the Rocky Mountains, etc. (*Annals* vii. 366, 1861), it is remarked that this species differs from *H. Vancouverensis* Lea "in having the incremental striæ more or less decussated by revolving lines, giving it a granulated appearance;" also that in some individuals "the decussation is to a great extent obsolete, or confined to the upper whorls only, and it seems to us that the two species cannot be separated."

Since the publication of that paper, I have received from Dr. Newcomb a specimen of *H. sportella* agreeing with Dr. Gould's description, and believe that it should be considered a distinct species.

In the larger specimens of *H. Vancouverensis* from Oregon (as in *H. concava* Say), microscopic spiral lines may be detected, and in the smaller forms found near San Francisco, those lines are sometimes more deeply indented, intersecting the striæ of growth, and giving more or less of a granulated character to parts of the surface of the shell, especially of the upper whorls. Dr. Newcomb observes (*Amer. Jour. of Conch.* i. 235) that the smaller forms referred to "have been distributed under the erroneous name of *H. sportella* Gould."

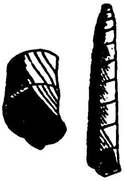
In *H. sportella*, not only are the incremental striæ more coarsely and regularly developed than in *Vancouverensis*, but the whole surface of the shell, both above, save the apicial whorls, and below, even within the umbilicus, is very distinctly decussated by the revolving lines, and consequently granulated. In the former the whorls are more flattened above, and the umbilicus is somewhat smaller.

H. Voyana Newc. of California (*Amer. Jour. of Conch.* l. c.) is an extremely interesting species of the same group. From the general character of the sculpturing, it seems more allied to *H. sportella* than *H. Vancouverensis.*

Achatina Californica, Pfr.

This species, described from specimens in the Cumingian Cabinet, has been attributed to Monterey, California. Some time since I received specimens, through Mr. Akhurst, from Bogota, New Granada, and forwarded one to Dr. P. P. Carpenter, with a request that he would have it compared with the type. After doing so, he reported to me: "Mr. Cuming* says that your shell is *certainly* A. Californica, auct."

Fig. 10.



A. Californica Pfr.

In future this should be excluded from lists of North American species. As it is little known, I add the figure engraved for the before-mentioned work of W. G. Binney.

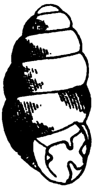
A. Californica appears to be viviparous; within one of my specimens I found two young shells, each having 2 to 2¼ whorls.

* * *

Pupa Rowellii Newc.

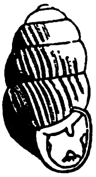
The general contour of *P. Californica* and *P. Rowellii*, is similar, but the latter has a slightly more tapering spire, and its aperture is smaller in proportion than in the former. The aperture of *P. Rowellii* is narrower at the base, and the basal tooth is longer and sharper than in *P. Californica.* The latter has elevated rib-like striæ, which are peculiar to it, and is the only prominent character distinguishing it from *P. decora* Gould.

FIG. 11.



P. Rowellii Newc.

FIG. 12.

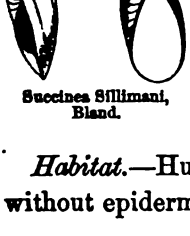


P. Californica Rowell.

Succinea Sillimani, nov. sp.

T. oblongo-ovata, tenuis, ruguloso-striata, nitidula, albida?; spira brevis, acuta; anfr. 3 convexi; sutura impressa; apertura obliqua, elongato-ovata, superne angulata, basi effusa; columella leviter arcuata, superne filariter incrassata.

FIG. 13.



Succinea Sillimani, Bland.

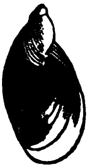
Shell oblong-ovate, thin, coarsely striate, shining, whitish? spire short, acute; whorls 3, convex; suture impressed; aperture oblique, elongate-oval, angular above, effuse at the base; columella slightly arcuate, with a thread-like thickening above.

Long. 20, diam. 8½ mill.; Ap. 13 mill. longa, medio 6 lata; anfr. ult. 17½ mill. longus.

Habitat.—Humboldt Lake, Nevada. A single example without epidermis, but fresh in appearance, was found and sent with fluviatile species to C. M. Wheatley by Professor B. Silliman, of Yale College, New Haven, to whom I dedicate the species.

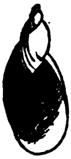
Remarks.—This shell in general form may be compared with *S. Haydeni* W. G. Binn., to which indeed it is closely allied, but it is more attenuated, the last whorl less tumid and the aperture more narrow. It is distinguishable from *S. Hawkinsi* Baird, of Brit. Columbia, having one whorl less and a differently formed aperture.

FIG. 14.



S. Haydeni W. G. Binn.

FIG. 15.



S. Hawkinsi Baird.

Succinea Stretchiana, nov. sp.

T. globoso-conica, tenuis, pellucida, nitida, striatula, virenti-cornea; spira brevis, obtusiuscula; sutura profunda; anfr. 3 convexi, ultimus of specimens were found under dry cowdung, about the edge of a swamp, by Mr. Richard H. Stretch.

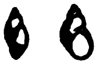
Remarks.—This species has some slight affinity with *S. avara* Say, but is, form alone considered, more closely allied to *S. inflata* Lea, and *S. campestris* Say, from both of which, however, it may readily be distinguished by its size, texture, and color. In one of my specimens of *S. Stretchiana* the apex has a reddish tinge.

Succinea Verrilli, nov. sp.

T. ovato-conica, tenuis, striata, subpellucida, aurantiaco-succinea; spira elevata, obtusa, apice globoso, rubello; anfr. 3 perconvexi; sutura profunda; apertura obliqua, rotundato-ovalis, columella arcuata, leviter callosa; perist. simplex, marginibus callo tenuissimo junctis.

Shell ovate-conic, thin, striate, subpellucid, orange-yellow colored; spire elevated, obtuse, with globose apex, of a reddish tinge; whorls 3, very convex; suture deep; aperture oblique, roundly oval; columella arcuate, with a slight callus; perist. simple, the margins joined with a very thin callus.

Fig. 17.



S. Verrilli Bland.

Long. 7, diam. 3½ mill.; Ap. 4 mill. longa, medio 3 lata; anfr. ult. fere 6 mill. longus.

Habitat.—Salt Lake, Anticosti Island, Gulf of St. Lawrence, N. Amer. A. E. Verrill, Professor of Zoology, Yale College, New Haven.

Remarks.—This species is closely allied to *S. Groenlandica* Beck, found by Prof. Verrill on Mingan Island, but is smaller, of different color, and has more distinct and regular incremental striæ.

I am indebted for specimens, and also for the following notes on the buccal plate and lingual dentition of *S. Verrilli*, to E. S. Morse.

Buccal plate abruptly arched, with one prominent central projection.

Lingual formula about 80 rows, 31–1–31. Plates notched at their outer posterior edges, longer than wide. Central plate with three minute denticles, the middle one being largest. Lateral plates bidentate, the outer denticle minute. Uncini irregularly dentate or notched.

Animal (in alcohol) black.

XX.—*Descriptions of Six New Species of Birds from Central America.*

By Geo. N. Lawrence.

Read October 23, 1865.

1. **Spermophila Hicksii,** sp. nov.

Male. Above and a broad band across the breast deep glossy black; rump feathers plumbeous at base, succeeded by a black band and terminating in white; upper tail coverts black; tail and wings black; bend

2. **Spermophila badiiventris,** sp. nov.

Male. Plumage deep black; the under wing coverts and spot on primaries pale straw yellow; inner webs of quills white at the base; a line down the middle of the abdomen dark reddish chestnut or deep bay color; the under tail coverts and also some of the feathers of the breast are marked with this color; inside of thighs white tinged with chestnut; bill and feet black.

Length 3¾ in.; wing 2; tail 1¾; tarsi $\frac{9}{16}$.

Habitat.—Nicaragua, Greytown. Collected by Mr. Robert Kennicott, April, 1865.

Specimen in Mus. Smith. Institution, No. 37618.

Remarks.—It resembles *S. corvina* (of which there are three specimens from the same locality), except in the bay color on the under plumage, and the light straw coloring of the under wing coverts and of the wing spot.

3. **Spermophila fortipes,** sp. nov.

Male. Upper plumage, sides of head, throat, breast, and sides black; a pure white semi-collar on each side of the neck, connected by a rather indistinct line of white across the throat, there is a narrow line of white at the base of the lower mandible, and an interrupted line of white extending from the bill down each side of the throat, connecting with the collar; abdomen white intermixed with black, less so in the centre; tail and wings black with a white spot on the primaries; bill brownish black; feet fleshy dark brown.

Length of skin 4¼ in.; wing 2¼; tail 1⅞; tarsi ⅝.

Habitat.—New Granada, line of Panama Railroad.

Remarks.—In general appearance much like *S. semicollaris*, but differs in having the white collar extending across the throat, in having white on the chin and a white line down each side of the throat; the feet are strikingly larger and stronger.

4. **Formicivora schisticolor,** sp. nov.

Male. Entire upper plumage, sides of the body, and lower part of the abdomen of a dark plumbeous slate color; throat, breast, and upper part of abdomen deep black, a few of the feathers on the upper part of the breast are marked with white at the base, not very apparent without raising the feathers; tail brownish black, crossed with darker nearly obsolete bars; quills brownish black, their inner margins greyish white; upper wing coverts black, ending conspicuously with white; under wing coverts black mixed with white; under tail coverts plumbeous grey, each feather with a blackish subterminal bar, and ending with greyish white; bill black; feet plumbeous flesh color.

Length (fresh) 4 in.; wing 2¼; tail 1⅝; bill ½; tarsi 11/16.

Habitat.—Costa Rica, Turrialba. Collected by F. Carmiol, May 26, 1865.

Spec. in Mus. Smith. Inst., No. 39079.

5. **Elainea Frantzii,** sp. nov.

Plumage above dark olive green; a concealed white crest, the bases of the feathers being of that color; tail feathers dark umber brown, with margins the color of the back; quills dark brown, the primaries narrowly edged with olive green, the secondaries and tertiaries with pale yellow; wing coverts dark brown, the middle and larger marked at their

Remarks.—In its upper plumage this species is much like *E. subpagana*, also in the markings on the wings, but they are quite different below, *E. subpagana* having the throat of a clear grey, and the breast and abdomen of a brighter yellow.

6. **Mitrephorus aurantiiventris**, sp. nov.

Third quill longest, first between fifth and sixth. Upper plumage olive green; centres of the long crest feathers dark brown, this color not showing except on those which project beyond the others on the occiput; wings and tail blackish brown, the secondaries narrowly edged with light dull olive, the innermost ones have their edges whitish; smaller wing coverts olive green, the others blackish brown, the middle ones ending with olive green, the larger with pale fulvous; throat and upper part of breast rusty fulvous, on the lower part of the breast becoming lighter, and on the abdomen and sides changing to bright orange yellow; under tail coverts pale yellowish fulvous; under wing coverts fulvous mottled with brown; upper mandible black, the under yellow; "iris black;" feet black.

Length (fresh) $5\frac{1}{2}$ in.; wing $2\frac{1}{2}$; tail $2\frac{5}{16}$; bill $\frac{3}{8}$; tarsi $\frac{1}{2}$.

Habitat.—Costa Rica, Tabacales. Collected by Dr. A. von Frantzius, January, 1864.

Spec. in Mus. Smith. Inst., No. of type 39052. Another specimen, a male, No. 39056, killed by Dr. Frantzius in April, 1865, at La Palma, has the coloring below much paler and the under mandible of a deeper yellow.

Six specimens examined agree quite uniformly in plumage.

Remarks.—This species much resembles *M. phæocercus*, but is rather smaller, the color above is more green, but they differ most in the coloring of the under plumage, *M. phæocercus* being below of a uniform deep reddish fulvous which is but little lighter on the lower part of the abdomen; the crest is rather darker than the back, but not as decidedly so as in *phæocercus*, in which it is olive brown; the under mandible in the new species is more yellow.

XXI.—*List of Birds from near David, Chiriqui, New Granada, collected for the Smithsonian Institution, Washington, by* MR. FRED. HICKS, *with Descriptions of New Species.*

BY GEO. N. LAWRENCE.

Read October 23, 1865.

FAM. TURDIDÆ.

1. *Turdus Grayii*, Bp.

FAM. TROGLODYTIDÆ.

2. *Thryothorus rufalbus*, Lafr.
3. *Troglodytes inquietus*, Baird. *Review*, p. 143.

FAM. MNIOTILTIDÆ.

4. *Mniotilta varia* (Linn.).
5. *Helminthophaga peregrina* (Wils.).
6. *Dendroica æstiva* (Gm.).

Panama bird to *hirundinacea* I had no specimens of that species with which to compare, but soon after receiving examples of both sexes, found I had erred in doing so. On a new examination it agreed better with *E. crassirostris*, but as they differed in some important characters I concluded to let it remain as it was for further investigation. Ten specimens from Chiriqui and Panama, now before me, have invariably much smaller bills than my examples of *crassirostris* from Bogota, being nearer those of *hirundinacea;* the coloring of the hind neck and back in the males is steel blue with a slight violaceous tinge, these parts in *crassirostris* are of a decided reddish violet, quite as much so as in *E. violacea.*

If these differences are not sufficient to admit of its specific separation, they at least give it the position of a well characterized permanent variety.

The female is of a bright olive green above, and below of a rather bright olivaceous yellow, lighter in the middle of the abdomen.

12. *Calliste Francescœ* (Lafr.).
13. *Tanagra diaconus*, Less.
14. *Ramphocelus dimidiatus*, Lafr.
15. *Ramphocelus passerinii*, Bp.
16. *Pyranga œstiva* (Gm.).
17. *Saltator striatipectus*, Lafr.
18. *Saltator intermedius*, Lawr.

Apart from the black throat band being smaller, in this species the under plumage has a decided wash of fulvous, whereas in *magnoides* the breast is of a clear cinereous; three specimens in the collection agree with my types, and twelve specimens of *magnoides* from Gautemala, differ from the others as above pointed out; all the specimens of *intermedius* seem smaller than the allied species. I have seen no specimen from Gautemala answering to my description of the female, which much resembles *S. magnus*. See Phil. Proc. 1864, p. 106.

FAM. FRINGILLIDÆ.

19. **Spermophila collaris**, sp. nov.

Male. Upper plumage glossy black, the feathers of the rump are plumbeous at base, between which color and the white end of each feather is a narrow black band; upper tail coverts black; throat and upper part of breast black, around the neck is a narrow collar of pure white, almost if not quite meeting behind; tail and wings black, a square spot of white on the primaries; lower part of breast and middle of abdomen white; sides white intermixed with black; "eyes dark brown, legs and bill black."

Length (fresh) $4\frac{1}{2}$ in.; wing $2\frac{1}{8}$; tail $1\frac{3}{4}$; tarsi $\frac{9}{16}$.

20. *Volatinia jacarina* (Linn.).
21. *Cyanospiza ciris* (Linn.).

FAM. ICTERIDÆ.

22. *Icterus spurius* (Linn.).
23. *Icterus Baltimore* (Linn.).
24. *Sturnella Mexicana*, Scl.

Length (fresh) 6 in.; wing 3; tail $2\frac{5}{8}$; bill $\frac{3}{8}$; tarsi $\frac{5}{8}$.
The female agrees in plumage with the male.

Remarks.—Somewhat like *E. subpagana*, but smaller and of a duller olive above, the breast and sides are of a cinereous shade, and the abdomen of a duller and paler yellow; in *subpagana* the breast, abdomen, and under tail coverts are of a uniform clear pale yellow.

27. **Elainea semiflava**, sp. nov.

Male. Upper plumage yellowish green; a line of pale yellow extends from the bill over and beyond the eye, there is a dusky spot just forward of the eye; tail brown with edges the color of the back, the outer web of the outer feather greyish white; quills dark brown narrowly margined with the same color as the back, except the tertials, which are broadly edged with pale yellow; smaller wing coverts colored like the back, the others brown ending with pale yellow and forming two bands across the wings; entire under plumage and under wing coverts bright yellow; upper mandible brownish black, the under yellow with the end brown; "eyes chocolate, legs black."
Length (fresh) 4 in.; wing 2; tail 2; bill $\frac{3}{8}$; tarsi $\frac{5}{8}$.

28. *Legatus albicollis* (Vieill.).
29. *Myiozetetes Columbianus*, Cab. et Hein.
30. *Myiodynastes nobilis*, Scl.
31. *Milvulus tyrannus* (Linn.).

Fam. MOMOTIDÆ.

32. *Momotus Lessoni*, Less.

Fam. TROCHILIDÆ.

33. *Lampornis Veraguensis*, Gould.

Fam. CUCULIDÆ.

34. *Piaya nigricrissa*, Scl.
35. *Diplopterus nævius* (Linn.).

Fam. RAMPHASTIDÆ.

36. *Pteroglossus erythropygius*, Gould.

Fam. FALCONIDÆ.

37. *Asturina magnirostris* (Gm.).

Fam. COLUMBIDÆ.

38. *Chamæpelia rufipennis*, Bp.

Fam. RALLIDÆ.

39. *Aramides ruficollis* (Gm.). ?

XXII.—*Catalogue of a Collection of Birds in the Museum of the Smithsonian Institution, made by* Mr. H. E. Holland *at Greytown, Nicaragua, with Descriptions of New Species.*

By Geo. N. Lawrence.

ones are marked like those on the sides of the head; upper mandible blackish brown, the under dark brown at base, with the end whitish horn color; feet dark brown.

Length of skin $4\frac{1}{2}$ in.; wing $2\frac{1}{8}$; tail $1\frac{5}{8}$; bill $\frac{9}{16}$; tarsi $\frac{3}{4}$.

3. *Pheugopedius atrogularis*, Salv. ? P. Z. S. 1864, p. 580.

This does not agree very satisfactorily with Mr. Salvin's description, but as the distribution of colors is much the same I have placed it provisionally as that species.

FAM. MNIOTILTIDÆ.

4. *Henicocichla aurocapilla* (Linn.).
5. *Dendroica æstiva* (Gm.).
6. *Basileuterus uropygialis*, Scl.

FAM. VIREONIDÆ.

7. *Hylophilus pusillus*, Lawr.

FAM. CŒREBIDÆ.

8. *Dacnis ultramarina*, Lawr.

FAM. TANAGRIDÆ.

9. *Calliste Francescæ*, Lafr.
10. *Tanagra diaconus*, Less.
11. *Ramphocelus passerinii*, Bp.
12. *Phœnicothraupis fuscicauda*, Cab. ♂ & ♀.
13. *Arremon aurantiirostris*, Lafr.
14. *Saltator magnoides*, Lafr.

Has the breast a clear cinereous, as in specimens from Gautemala.

FAM. FRINGILLIDÆ.

15. *Spermophila corvina*, Scl.
16. *Cyanospiza cyanea* (Linn.).

17. *Embernagra striaticeps*, Lafr.
18. *Euspiza Americana* (Gm.).

Fam. ICTERIDÆ.

19. *Cassiculus Prevosti* (Less.).
20. *Cassiculus microrhynchus*, Scl. & Salv.
21. *Icterus mesomelas* (Wagl.).
22. *Quiscalus macrourus*, Sw.

Fam. DENDROCOLAPTIDÆ.

23. **Synallaxis nigrifumosa,** sp. nov.

Crown and wing coverts bright reddish chestnut, the red color of the crown begins in front on a line with the middle of the eyes; back and rump dark brown; the tail consists of eight rectrices, the outer very short, and is of a fine deep or vandyke brown, darker than the back and of a different shade; quills dark brown, the under wing coverts of a light reddish cinnamon, the inner edges of quills at base dull cinnamon; front, sides of the head, and under plumage smoky black, the throat in some positions quite black and freckled slightly with greyish white; on the sides and under tail coverts there is a wash of brown; bill black, the coverts, the under wing coverts, and inner margins of quills white; the under plumage pure white, except on the lower part of the abdomen where it is blackish grey, and the side feathers covering the thighs which are black; the feathers of the thighs are black at the base, and largely white at the ends so as almost to conceal the black portion; crissum jet black; bill and legs black.

Length of skin $8\frac{1}{2}$ in.; wing 4; tail $3\frac{1}{8}$; bill following the curve $1\frac{3}{8}$; tarsi $1\frac{5}{16}$.

Female. The plumage above is of a deep bright rufous, the interscapular spot equally as large and white as in the male; tail dark brownish cinnamon; inner webs of quills dark livery brown, the outer webs and the wing coverts colored like the back; under lining of wings white, inner margins of quills greyish white; the under plumage is white, with the sides and abdomen light cinereous, the lower part of the abdomen and side feathers covering the thighs light rufous; the thighs and under tail coverts deeper rufous; bill and feet black; in size not differing materially from the male.

Remarks.—It has for its allies *T. melanurus*, *transandeanus*, and *melanocrissus*, but is larger and has a more powerful bill than either; in its black crissum it resembles the last two, but *transandeanus* in this part has the feathers ending with white, and has the entire abdomen pure white, with the long side feathers lying over the thighs light cinereous; the female of *transandeanus* is of a lighter color. I have but one male specimen of *melanocrissus* with which to compare, this is less white underneath than any of its affines, the sides of the breast and of the abdomen being largely washed with blackish cinereous; the wing coverts, in my specimen, are without white ends except two of the larger, which are just tipped with that color; it also differs from the present bird, and all the others, in having the black on the sides of the head, as far down as, and on a line with the lower part of the under mandible; in all the others the black terminates on a line with the rictus.

I do not make a comparison with *T. melanurus*, as in that species the crissum is white.

This fine species I have dedicated to Mr. H. E. Holland, as a well merited compliment for the careful preparation and fine order of the specimens enumerated in this catalogue.

28. *Thamnophilus affinis*, Cab. ♂ & ♀.
29. *Ramphocænus rufiventris* (Bp.).
30. *Grallaria dives*, Salv. P. Z. S. 1864, p. 582.

FAM. TYRANNIDÆ.

31. *Todirostrum cinereum* (Linn.).
32. *Tyrannulus semiflavus*, Scl. & Salv.
33. *Elainea semiflava*, Lawr. Antea, p. 177.
34. *Myiozetetes Texensis* (Giraud).
35. *Megarhynchus Mexicanus* (Lafr.).
36. *Myiarchus Lawrencii* (Giraud).
37. *Tyrannus Carolinensis* (Gm.).
38. *Tyrannus satrapa* (Licht.).
39. *Tyrannus griseus*, Vieill.

I can see no difference between the specimen before me and others from Florida; in birds from both localities, the under wing coverts and under tail coverts are more yellow than in examples from St. Thomas and Sombrero.

43. *Chiromachæris Candei* (Parzud.).

44. *Carpodectes nitidus*, Salv. P. Z. S., 1864, p. 583.

Since the description of this remarkable species by Mr. Salvin, I believe no other specimen has been obtained until the acquisition of this one by the Smithsonian Institution; it is in fine plumage and agrees in every respect with the description above cited. It is labelled, "male, eyes black, May 28th, 1865."

FAM. ALCEDINIDÆ.

45. *Ceryle inda*, Linn.

FAM. BUCCONIDÆ.

46. *Malacoptila Verapacis*, Scl. & Salv.

FAM. TROGONIDÆ.

47. *Trogon Massena*, Gould.

48. *Trogon melanocephalus*, Gould.

49. *Trogon tenellus*, Cab. ♂ & ♀.

These specimens agree precisely with those from Panama which I characterized as *tenellus* (Ann. Lyc. N. Y., Vol. VIII., p. 3), and consequently differing from *atricollis* as pointed out. I notice some additional differences, viz. the central tail feathers are wider, the black and white bars on the tail narrower, and the waving lines on the wing coverts are finer and darker in *atricollis*.

FAM. TROCHILIDÆ.

50. *Pyrrhophæna Riefferi* (Bourc.).

FAM. RAMPHASTIDÆ.

51. *Ramphastos piscivorus*, Linn. (*carinatus*, Sw.)

FAM. PICIDÆ.

52. *Celeus castaneus* (Wagl.).

53. *Centurus Pucherani* (Malh.).

Fam. PSITTACIDÆ.

54. *Conurus aztec*, Souancé?
55. *Pionius senilis* (Spix).

Fam. FALCONIDÆ.

56. *Urubitinga anthracina*, Nitzsch.

Fam. ARDEIDÆ.

57. *Botaurus pinnatus* (Licht.)?

I have some doubt as to the correctness of calling this specimen *pinnatus*, as it does not altogether agree with the descriptions of that species, the recorded localities of which are Guiana and Brazil. I think it has not been observed before north of the Isthmus; until a further opportunity offers for investigating it more satisfactorily I prefer to leave it as *pinnatus*.

The claws are much curved and very long, that of the hind toe measuring 1½ in., the others about 1 inch.

Fam. RALLIDÆ.

XXIII.—*On the Mineralogy of New York Island.*

By S. C. H. Bailey.

Read June 20, 1865.

To one not familiar with the mineralogy of our island, it will seem scarcely credible, that a larger number of species have been found upon it than at the famous Lamöe Rock of Norway, or in the prolific mines of Arendahl; larger than the noticed lists of those found at Haddam or Franklin, or any single locality in the United States.

Here, in a city without mines, or even quarries, other than such as have been wrought in the requirements of building, as foundation stones, or in regulating the grade of streets, and where, with the exception of a few deep rock cuttings, we have merely scratched the surface, more than one-twentieth of the known mineral species have been found.

But if there has been much of this cutting of the crust of our rock formation, it should also be remarked, that by far the larger number of specimens, perhaps some as yet unnoticed species, may have been disclosed, only to be at once buried again beneath a mass of rubbish, for so rapid is the progress in excavating for sewers, streets, and building sites, that what is thrown out one day is often covered up, or carted away the next. And it will also be borne in mind, that the workmen engaged in this labor are not, like the miners of Cornwall or Saxony, always on the alert for specimens, known to them to be worth saving.

Yet with all these drawbacks to the full knowledge or the development of our resources, we present a list which ought to make our city famous as a mineral locality. As it is, whatever of fame belongs to our island as a locality is due to the zeal of a few individuals, who have taken an interest in collecting such specimens as may be found.

The number of our species is not, as is the case with many localities, so much increased by nearly related or questionably distinct minerals, most of them being well characterized. Nor are the varieties less interesting in *kind* than in *number*. The larger portion of them are, it is true, of the common species, but some of them are rare.

With two or three exceptions, all the minerals of which I shall make mention in this paper, occur on our island in place, though it may not be proper to name it as a locality in the sense in which the term is commonly used, not so much, however, that they do not exist, as because of the fact that a locality which promises an abundant supply at one time, may be shortly afterwards covered with buildings, thus obliterating all traces of the mineral having ever been found.

The area to which my own explorations have extended, is all embraced between 37th and 59th streets, except a passing glance at the fragments of rock scattered along the track of the Hudson River Railroad.

It is more than probable that the next ten years will see these localities swept away before the advancing tide of warehouses and dwellings, and a search for minerals on this part of the island will prove as fruitless as it would now be at Cor-having that substance incrusting and imbedded in the surface of the mica, giving it the appearance of mingled burnished and frosted silver work. A black rhomboidal mica, from the vicinity of 57th street, precisely resembles that from Brevig, Norway. The same neighborhood has also furnished firm, small, but perfect, crystals of Muscovite.

Among the enclosed minerals of our micas, are flattened crystals of *quartz*, *garnet*, *kyanite*, and other crystals of *mica*, in which the planes or axes lie at nearly all angles with those of the larger plates in which they are imbedded, and from which they are easily detached, affording an instance of distinct crystals imbedded in larger crystals, or in massive specimens of the same mineral.

The optical character of our micas seems not to have been made the subject of examination as yet.

In the coarse granite of 2d avenue, near 42d street, large crystalline masses of *feldspar* abound, varying in color from greenish-white, through flesh color and red, to a peculiar dark brown, much resembling the *perthite* from Canada.

Occasionally, large and perfect crystals, presenting the faces of a hexedral prism with two terminal planes, furnish specimens worthy a place in the cabinet.

In some instances the colored feldspar produces a handsome red granite, although the masses are usually too large, and the accompanying quartz and mica too limited in quantity to make a good building granite.

Near 50th street, the *kaolin* resulting from the decomposition of feldspar is so fine, that when wet it feels as smooth and soft as tallow, but falling to powder when dry. It often occurs in the same rock with the unaltered feldspar.

Garnets are abundant in many places, and in some specimens from 42d street, the crystals were as large and perfect, and of as good color as those from any American locality. But few of them were found, and these were imbedded in veins of gray quartz from the gneiss rock. The form is the trapezohedron. Other imperfect crystals, of a pink color, are scattered through the granite rocks near the East river; some varieties approaching *cinnamon stone*, others *pyrope*. In a mass of greenstone rock, near Manhattanville, I found some garnets forming a drusy coating, varying in color from a greenish-white to yellowish-brown and black, presenting faces of the rhombic dodecahedron, but not forming perfect or distinct crystals. And in boulders of a reddish-grey feldspathic rock in the same vicinity, were found drusy cavities lined with dark greenish-grey crystals, precisely resembling *aplome* garnet, though the characteristic striæ were wanting on the faces of the crystals, some of which are near a quarter of an inch in diameter. Two or three of the specimens were showy and unique.

Kyanite is diffused through the gneiss of the island, usually pale in color but sometimes showing good shades of blue or green. The blades are small, and the specimens unfit for the cabinet.

About two years since I found at the Kipp's Bay quarries a mineral which has been pronounced *kyanite*, though admitting of doubt as regards its identity with that mineral. It occurs sub-transparent crystals of yellowish-brown *tourmaline*, with perfect three-sided terminations, which appear to have come from the decomposed limestone or dolomite of that neighborhood. A variety of granular *schorl* from Kipp's Bay has a very brilliant lustre and forms a mineral not easy to determine at first sight.

The *rubellite* mentioned as having been found in the King's Bridge limestone, was probably *rutile*, which it somewhat resembles, and which occurs there.

Quartz crystals from the Kipp's Bay quarry, of a smoky or cairngorm color, and rarely transparent, have presented curiously rounded surfaces of peculiar lustre, though it may be here remarked, that quartz in interesting forms is not common to our county. Another variety of quartz occurs in small masses imbedded in flesh-colored feldspar, of a smoky tinge—sub-transparent—sometimes showing traces of crystallization, but with the edges and solid angles rounded like the so-called fused quartz of St. Lawrence county.

Epidote is met with in various parts of the island, both in place and in boulders, and very brilliant and perfect crystals of a fine dark green color, are occasionally found, and though sometimes distinct, the crystals are generally small and drusy. A few specimens of light green fasciculated crystals have been also found. The granular variety, or *skorza*, may be met with almost wherever boulders occur, and it also forms veins, or strata, in the rocks of the central and upper parts of the island.

Spathic iron, or *chalybite*, often accompanies the epidote, and presents various interesting forms. The color varies from light yellowish and greenish-white to dark brown. Small, perfect rhombic crystals were thrown out among the rock heaps found in cutting through 57th street, and from the same locality were dull colored masses, having the appearance of grouped crystals partially fused. At various places the variety *sphærosiderite* has been found in globular and drusy forms, with velvety lustre, and dark and light brown colors. In a few instances the globules are flattened into lens-shaped crystals, like those from Traversella, and forming specimens meriting a prominent place in the cabinet.

Stilbite is not only widely diffused, but is, in many cases, of more than ordinary beauty. Some of the specimens are of a fine red color, but have a brilliant lustre, and present either fasciculated and grouped crystals, or flattened stellated forms of showy appearance. Still more rarely it assumed a plumose form, disposed on gneiss abounding in black mica. It was found at 42d and 50th streets, along the New Haven Railroad track, and at Yorkville. It is often associated with *heulandite* in small, yellowish-white crystals, and with *chabasite* in rhombic, unmodified crystals, of a reddish color resembling *acadiolite*. Sometimes the chabasite occurs as a crystalline crust not forming distinct crystals.

The stilbite exists doubtless in large quantities a few feet below the grade of the streets in the vicinity of 1st avenue and in other localities, but the other zeolites are found sparingly.

We have *phosphate of lime*, both massive (phosphorite) and elsewhere, in masses an inch in diameter, as well as in distinct hexedral tables.

The only variety of Hornblende of much interest is the *anthophyllite* from near 57th street, where the specimens, when not weathered, are finely fibrous, radiated, or interlaced with a silky lustre, and very tough.

From the same serpentine rocks was obtained a number of good specimens of *chrysotile*, which has a fair lustre, but the fibres have a very harsh and brittle feel. Altogether, it is deserving of further examination.

Both *magnetic* and *specular iron* are found sparingly, the latter accompanying crystals of *albite*, *apatite*, and in one or two instances, green *sphene*. A locality of these minerals in 38th street promised some good specimens, but it was soon covered with buildings.

The feldspar near Broadway and the Central Park has furnished *orthite* in good crystals. It occurs in slender black prisms, sometimes two inches long, of a pitchy lustre like the Norwegian mineral, and fully as good.

It is more than probable that a closer examination of the rocks containing the orthite, will disclose some of the other species of minerals which often accompany it, and which contain *cerium*, *florium*, or *titanium*.

From a large mass of rock near Manhattanville, I broke two or three specimens of *graphic tellurium*. The rock, which was three or four feet in diameter, did not appear to be a boulder, though I do not remember to have seen similar rock *in situ* upon the island, nor indeed anywhere in our State. It bears some resemblance to that from Transylvania, in which the tellurium there occurs.

The foregoing minerals were all found within the limits before mentioned, and for those from different parts of the island, I am indebted to others both as regards the localities and a description of the specimens.

Mr. J. Deems cf this city, some time since, found crystals of *rutile* at Kingsbridge, and in the collection at Barnum's Museum are very good specimens of titanium, said to have been found near McComb's Dam.

Professor Stone had some interesting specimens of *pyroxene* from the quarries of limestone near Kingsbridge, and *tremolite* is reported from the same locality.

The occurrence of *vivianite* and *apophyllite* at Harlem, is mentioned by Beck in his report upon the mineralogy of the State, but I have never seen specimens of either, known to have been found within the county of New York. Nor have I seen *staurotide*, reported by the same author, except a few very poor crystals from the mica slate upon the railroad track on the North River.

In a report made about the time of the laying out of the Central Park, it was stated that *tetraphyline* had been found within the limits of the Park near 60th street, and the line of 7th avenue. At 1st avenue, and in other places, I have observed a dark brown mineral resembling *aluardite*, or some of the like phosphates of manganese.

One other species of doubtful identity, but precisely resembling *uranite*, I found on the lands belonging to Columbia Col-

The vicinity of Corlears Hook was at that time, or rather had been, the spot where the largest number of varieties was to be obtained, probably from boulders.

The most interesting things mentioned in his list, are *adularia* and *cleavelandite*, though it is not improbable that he applies the former name to an *albite* or *perikline* found with the *chlorite* before referred to, and he may have considered *cleavelandite* a laminated mineral (perhaps calcite), of very peculiar appearance, of which a few specimens occurred at 42d street with handsomely crystallized quartz.

In connexion with the mineralogy of this island, it is worthy of remark, that the manner in which, in two or three instances, the species are grouped, as well as in the individual varieties, they exactly resemble specimens from foreign localities.

One instance is the association of *orthite* with *magnetite* in flesh-colored feldspar, like that from Finbo in Sweden, and a still more striking resemblance is that of the *perikline*, *apatite*, *specular iron*, and green *sphene* with *chlorite*, to the specimens thus associated which are brought from the Grisons.

It should not be forgotten that Manhattan Island presents principally the granite and gneiss formations, the two rocks which are everywhere the repositories of so many of the mineral species, and from the number and character of those already observed, it will be seen that it needs only a watchful eye to secure a most interesting collection.

I confess to a sort of patriotic pride in the profusion of good things which it has yielded me, and the success which has rewarded the searches my limited leisure has allowed me to make; and I am certain that it would be a just source of pride to every lover of natural science, having a home in our city, if we had a suitable building for the display of a collection of the mineral treasures which our island from time to time has afforded, and still continues to furnish.

XXIV.—*Catalogue of the* MOLLUSCA *of* LITTLE GULL ISLAND, *Suffolk County, New York.*

BY SANDERSON SMITH.

Read May 1, 1865.

LITTLE GULL ISLAND is situated nine or ten miles east of Oyster Pond Point, which terminates the northern peninsula of eastern Long Island—Plumb Island and Great Gull Island intervening. It is a mere bank of gravel and boulders, not over 100 yards in its greatest length, and probably nowhere of half that width. A catalogue of the mollusca collected on this Island may prove of some interest, as showing the species which inhabit such an isolated and exposed situation.

An artificial hillock, built up on all sides with masonry, supports the lighthouse and keeper's house, or they would probably have been entirely swept away by the waves.

Pyrula canaliculata Brug.
Buccinum undatum Linn.
Nassa trivittata Say.

Tectura testudinalis Gray.
Anomia ephippium Linn.
Anomia aculeata Gmelin.

The only point deserving remark in this list seems to be the absence of *Pyrula carica*, which I learned from the light-house keeper was never found on the island, and very rarely indeed on Great Gull Island. *N. triseriata*, *N. trivittata*, and *L. littoralis* were remarkable for the depth and brilliancy of their colors; *N. trivittata* almost always displaying the three bands from which its name is derived, and the colored marking of *N. triseriata* often covering the entire surface. *N. triseriata* and *L. littoralis* were of extreme solidity, and *N. heros* was large and solid.

All the above remarks as to the absence or great rarity of *Pyrula carica*, and the coloring, etc., of *N. trivittata*, *L. littoralis*, *N. triseriata*, and *N. heros*, from little Gull Island, apply equally to specimens from similarly exposed localities which I have examined on Montauk Point and at Newport, Rhode Island.

XXV.—*Remarks on the* SPHINGIDÆ *of Cuba, and Description of a New Species of* AMBULYX *from Brazil.*

BY AUG. R. GROTE.

Read November 27, 1865.

IN a paper entitled "Notes on Cuban Sphingidæ," published in the Proceedings of the Entomological Society of Philadelphia, Vol. v., pp. 33–84, I have determined forty-six species belonging to this Lepidopterous family, found on the Island of Cuba, from specimens, which form part of a large collection of insects, purchased by the late respected Dr. Thomas B. Wilson, from Professor Felipe Poey of Havana. The object of the present paper is to give the determinations of certain additional species, which I subsequently received from Mr. John Gundlach of the same place, as well as to offer a few remarks in relation to the synonymy of certain species already noticed. I have much pleasure in receiving a letter from Mr. John Gundlach, from which I learn, that the new species of *Erinnyis*, which I described in the paper already alluded to, are partly those which Dr. Herrich-Schæffer had been unable to identify as having been already described. Thus, the species described under "No. 7," and of which Dr. Herrich-Schæffer remarks:—"Eine neue Art, welche ich auch von H. Kaden aus Mexico erhielt"—is the species which I also have regarded as new and described as *Erinnyis merianæ* Grote. My determinations of *E. ello*, *E. alope*, *E. caicus*, and *E. guttularis*, accord with those of Dr. Herrich-Schæffer, while *E. rimosa* Grote is the species, as I have stated, that Dr. Herrich-Schæffer doubtfully regards as intended by Cramer under the specific name of "*scyron.*" I describe here an allied species which perhaps equally resembles the figure of the Dutch entomologist, and I remain of the opinion, that the coarseness of the illustration will lead to the entire rejection of the specific name used by Cramer, since I can with difficulty believe that a "Sphinx" will be discovered, that can be referred with certainty to the "*Sphinx scyron*" of this author. Mr. Gundlach also assures me that the individual I have regarded as the female of *E. melancholica* Grote, is a plare nicht verschieden; der schärfer gezackte Saum der Vfl. in Z. 2 tiefer ausgeschnitten, und der ganz gerade Schrägstreif bei ⅓ der Vfl. (*camertus*, Cr.), gehén unmerklich in den weniger•gezackten Saum und den geschwungenen Schrägstreif, wie er bei H. Z. f. 595, gezeichnet ist, über." Corr. Blatt, p. 57 (21), 1865. I am quite satisfied, however, that *E. lugubris* and *E. camertus* are distinct and valid species; and, having studied the figures in the Zutraege to which Dr. Herrich-Schæffer alludes, I am assured that these do not represent *E. lugubris*, but *E. gorgon*, Cramer, sp. (♀). Thus the characters which are regarded as intermediate between *E. lugubris* and *E. camertus*, by Dr. Herrich-Schæffer, are partly those that distinguish *E. gorgon.* I feel satisfied, however, that these should be regarded as distinct; the *habitus* of all three species being different, that of *E. lugubris* approaching *E. danum*, a species readily distinguished by the ornamentation of the secondaries, but which is perhaps regarded as a variety of *E. lugubris* in the British Museum collection, as I have elsewhere noted.

The reference to Hübner's figures of *E. lugubris*, in the "Zutraege," should thus be transferred to the synonymy of *E. gorgon*. Mr. Walker is then the first to place the *Sphinx lugubris* of Linnæus and Drury, in its proper genus, since Hübner in the "Verzeichniss" (1816), refers to the species under an adaptation of Cramer's subsequent trivial name, *Fegeus* (*Fegens*, Walk., Clem.).

A thorough investigation into the synonymy of the species I have determined as *Philampelus vitis*, undertaken by Mr. Coleman T. Robinson and myself—the results of which are published in the Proceedings of the Entomological Society of Philadelphia—has shown that this determination is correct. This species is first described by Linnæus, who refers to a figure of M. Merian's, which, although rude, must be accepted as representing this species, afterwards accurately figured by Drury in 1770, since, in the colored copies of the "Ins. Sur.," a pink terminal band is drawn along the external margin of the secondaries, which is one of the strongest specific characters of the insect. Cramer is the first, and, until now, the only author to figure the second species (*fasciatus* mihi, non Sulzer), which he does on Plate 268, Fig. E, while erroneously regarding it as the female of the species figured on Plate 267, Fig. C. This latter figure accurately represents the *Sphinx vitis* of Linnæus, Merian, Drury, W. V., Abbot and Smith, and the *Philampelus vitis* of Harris.

I find, besides Hübner's synonym for *P. vitis*—of *Dupo jussieuæ* (under which trivial name Mr. Walker and Dr. Clemens erroneously describe *P. vitis* Harris, etc.), that Sulzer has figured the species as *Sphinx fasciatus* Sulzer, a name, which, as long since remarked by Cramer, must be referred as a synonym to *Sphinx vitis* Linn. (*S. vitis* Cramer, Plate 267, Fig. C). I had no access, as stated, to Sulzer's work, when determining the species, and have erroneously used the trivial name proposed by Sulzer, for the *P. vitis* of Mr. Walker and Dr. Clemens, a species which must receive a new name, since it has been hitherto confounded with Linnæus's species.

For the reason that Dr. Harris's description of *Philampelus* of the authors above cited (*Philampelus jussieuæ* Clem.), is described as belonging to the distinct species now named *Philampelus linnei;* nor are Cramer's two figures kept separate. So that, in view of this confused synonymy, the observation of Dr. Clemens, that he is disposed to place the true *P. vitis* (*P. jussieuæ*, Walk. Clem.), as a "variety," is capable of an explanation; in reality, the two species are perfectly distinct and readily distinguishable.

PERIGONIA, Boisduval.

Perigonia divisa.

Perigonia divisa, Herrich-Schæffer, MSS.

Differs from the typical species of the genus in the shape of the wings; the apices of the primaries are roundedly exserted, external margin somewhat irregular. More olivaceous and smaller than *P. lusca.* The paler transverse lines on the upper surface of the anterior wings are straight; a very prominent, whitish, apical streak extends downwards, obliquely, to first median nervule. Secondaries full; external margin rounded, excavate before anal angle, latter hardly so prominent as in *P. lusca.* Above anal angle some paler scales, divided centrally by a narrow darker line; internal margin clothed with yellow scales. The yellow costal patch does not extend as a band across the middle of the wing, but is spread somewhat diffusedly, crossed by the darker clothed nervures, to the base of the wing. Abdomen somewhat fusiform, with paler marginal scales on the segments posteriorly.

Expanse (female), 2.30 inch. Length of body, 1 inch. Number $\frac{243}{115}$ of Mr. Gundlach's and Prof. Poey's Colls.

HYLOICUS, Hübner.

Hyloicus Poeyi.

Erinnyis Poeyi, Gundlach, MSS.

Allied to *Hyloicus plebeia*, Fab. sp., but a paler, slenderer, and smaller species, with elongate wings. Above, the primaries are cinereous, marked confusedly with blackish streaks. A distinct black apical streak, running very obliquely across apical and post-apical interspaces. Black dashes at the base of medio-central and posterior interspaces. A subterminal, narrow, very acutely dentate, angulated, black line, broadly margined before by whitish scales. Some black marks on costa, and on the disc. Base of the wing with interrupted zigzag black lines. Secondaries, pale, blackish, with no paler shades or bands; internal margin fringed with whitish scales, which cover anal angle and extend along the inner border, within the margin. Beneath, immaculate, pale blackish; secondaries, paler towards the base and along internal margin.

Head and thorax cinereous, latter paler towards the sides;

the interspaces beyond the disc. Base, largely black. Terminally the wing is black, shading to brownish at the apical interspaces and along external margin. Transverse lines obsolete.

Secondaries, yellow at base and along internal margin, with very broad, black, terminal borders. Under surface of primaries, rather pale brown, suffused with a much darker terminal shade and showing an indistinct, darker, subterminal line, slightly arcuate and dentate between the nervules. Secondaries with the base more greyish, otherwise resembling their upper surfaces in coloration.

The caputal, thoracic, and abdominal parts are quite similar to those of *E. rimosa* Grote, which latter forms, with *E. congratulans*, a group in the genus, characterized by the elevated, square, thoracic parts, which are but slightly advanced before the insertion of the primaries.

Expanse (female), 3.30 inches. Length of body, 1.60 inches. Number $\frac{652}{1083}$ of Mr. Gundlach's and Prof. Poey's Colls.

ERINNYIS, Hübner.

Erinnyis cinerosa, n. s.

Size of *E. œnotrus* and *E. melancholica*, as the female of which latter species I have hitherto regarded it. Mr. Gundlach sends a second female specimen, and states, that the male differs by having a longitudinal streak of darker cinereous scales on the primaries above, and in that the tegulæ are blackish with whitish external margins. The female has dark grey tegulæ, with very faint indications of the whitish borders. Anterior wings, pale cinereous, with very confused darker streaks and shades. An extremely irregular, narrow, dark, sub-basal line can be detected. An oblique, dark, costal shade, at about the middle of the wing, stretching to the sub-terminal dentate line, which it joins at the medio-central interspace and where it is more prominent and darker. A second, dark, costal shade at the inception of the sub-terminal line. Terminally, the wing i darker; nervules prominently tipped with exserted pale fringes.

Secondaries, reddish-brown, with rather faint and narrow dark terminal borders; hardly excavate before anal angle; fringe on anal angle and internal margin, whitish.

Under-surface, brownish, shaded with reddish at the base of primaries; secondaries, more largely reddish, whitish along internal margin, crossed by two punctate lines. Head and thoracic surface above, dark cinereous, without prominent markings. Abdomen brownish cinereous, with paler hairs at the base of the segments; two darker, longitudinal, dorsal, shade lines.

Beneath, brownish cinereous, whitish centrally; abdomen with lateral dark segmentary spots. Legs brownish; anterior tarsi paler on the outer surface, posterior pair annulated with whitish scales.

Expanse (female), 3.10 inches. Length of body, 1.60 inches. Number $\frac{376}{1084}$ of Mr. Gundlach's and Prof. Poey's Colls.

This species differs from *E. melancholica*, in the cinereous, not brownish hue, of the upper surface of the primaries, and in the shape of the secondaries. *E. melancholica* resembles *E. œno-*

smallest species of the family—*C. noctuiformis*, Walk. sp. Although this species bears a resemblance to *Perigonia*, in the coloration of the secondaries, I interpret its structural characters as allying it to *Erinnyis*, belonging to a different tribe of the family Sphingidæ.

To the forty-six species which I have hitherto determined as authentically occurring on the Island of Cuba, those which I have here enumerated can be added, making fifty-one species of Sphingidæ in all, distributed among the genera as follows:

AELLOPOS, 2: *tantalus*, Linn. sp.; *titan*, Cram. sp. EUPYRRHOGLOSSUM, 1: *sagra*, Poey sp. ENYO, 3: *lugubris*, Linn. sp.; *camertus*, Cram. sp.; *danum*, Cram. sp. HEMEROPLANES, 1: *pseudothyreus*, Grote. PERIGONIA, 3: *divisa*, H-S.; *lusca*, Fabr. sp.; *lefebvrii*, Lucas sp. CALLIOMMA, 1: *lycastus*, Cram. sp. PERGESA, 1: *thorates*, Hübn. sp. CHŒROCAMPA, 6: *gundlachii*, H-S.; *irrorata*, Grote; *nechus*, Cram. sp.; *porcus*, Hübn. sp.; *robinsonii*, Grote; *tersa*, Linn. sp. DEILEPHILA, 2: *calverleyi*, Grote; *lineata*, Fabr. sp. PHILAMPELUS, 4: *vitis*, Linn. sp.; *linnei*, Grote & Robinson; *lycaon*, Cram. sp.; *labruscæ*, Linn. sp. PACHYLIA, 3: *ficus*, Linn. sp.; *inornata*, Clemens; *resumens*, Walk. AMBULYX, 2: *strigilis*, Linn. sp.; *gannascus*, Stoll, sp. PSEUDOSPHINX, 1: *tetrio*, Linn. sp. AMPHONYX, 3: *antæus*, Drury, sp.; *duponchel*, Poey; *cluentius*, Cram. sp. SPHINX, 5: *rustica*, Fabr.; *carolina*, Linn.; *cingulata*, Fabr.; *brontes*, Drury; *afflicta*, Grote. HYLOICUS, 1: *poeyi*, Gundlach, sp. ERINNYIS, 11: *rimosa*, Grote; *congratulans*, Gundlach; *caicus*, Cram. sp.; *ello*, Linn. sp.; *alope*, Drury, sp.; *merianæ*, Grote; *œnotrus*, Cram. sp.; *melancholica*, Grote; *cinerosa*, Grote; *pallida*, Grote; *guttularis*, Walk. sp. CAUTETHIA, 1: *noctuiformis*, Walk. sp.

The following interesting species, belonging to the genus *Ambulyx*, is contained in the handsome and extensive Collection of Lepidoptera belonging to Mrs. S. W. Bridgham of this city. It is from Brazil.

AMBULYX, Boisduval.

Ambulyx sexoculata, nov. sp.

Size large. Anterior wings, sub-falcate: costa, straight, rounded at the apices; external margin sinuate, a single excavation at the apical interspace as in *Ambulyx gannascus;* internal margin very sinuate, S-shaped; post-apical nervule produced, at its extremity, beyond the apex. Posterior wings slightly excavate between the nervules; a prominent excavation in the interspace before anal angle. Primaries, dark brownish, paler towards the base and along costa, the color deepening along external margin. At extreme base, a small, very dark, vinous-brown spot. Beyond, a very broad, prominent, transverse, almost erect band of the same hue, resting on internal margin and extending upwards to median nervure, ending abruptly and somewhat roundedly. On the side next the base of the wing, the margin of this block of dark-colored scales, is very nearly straight; on the outer side, a single rounded projection takes place at about the sub-median nervure.

shows a faint reddish tinge. Terminal space, intense rich brown, deepening in color to the edge.

Secondaries bright yellow with a pinkish tinge, which latter is bright and determinate at base. The wings are crossed by three black, shaded bands; of these the inner is the widest and most determinate, extending from costa to internal margin, before which it is slightly inwardly dilated. The middle band is very distinct in the upper half of the wing, below its middle it joins the outer band, this latter is fainter, more diffuse, and less prominent, covering the wing at anal angle. All the nervules are marked very prominently with black scales, which diffusedly extend on each side into the interspaces. Between the inner transverse band and the base of the wing, there are no dark scales or markings whatever, this part of the wing being covered with delicate pink, and longer, hair-like scales.

Subterminally (on the middle transverse band) are three distinct, moderate, ocelloid spots; one on the medio-central, one on the medio-posterior nervules (this latter ocellus the largest), and one on the sub-median nervure. These ocelloid spots are composed of black scales, and have narrow, pale blue, annulate borders. From them, this species derives its specific name. Terminally, the wing is shaded with pale blackish scales.

Under surface covered with reddish-ochreous scales. The primaries are crossed by broken dark bands; terminal space darkly margined inwardly, covered with pale frosted scales. Secondaries, with the three transverse bands of the upper surface, vaguely indicated; the fusion of the middle and outer bands more clearly shown than on the upper surface.

Thorax above, pale brownish, of a mixed shade difficult to describe precisely, somewhat paler than the primaries above. Tegulæ, as usual in this genus and in *Philampelus*, with large lateral subtriangulate spots, composed, in this instance, of rich, dark, vinous-brown scales. Head, above the antennal insertion, concolorous with upper pro-thoracic parts. Clypeus, or "front," covered with thick scales which are concolorous with the dark tegulæ. Palpi stout, thickly covered with close squamation; above, these are pale, concolorous with vertex and "collar;" beneath and on the sides, the scales are of a bright, rosy-brown hue. Beneath, the thoracic parts are clothed with rather long, bright, rosy-brown scales. Legs, lead-color; darker, somewhat brownish, on the femora. Abdomen above, concolorous with primaries; basal segment covered with dark vinous-brown scales, like those on the tegulæ, as is also the anal segment. Beneath, of the same rosy-brown hue of the under thoracic parts, though perhaps a little paler. Expanse (female) 4.70 inch. Length of body 2.00 inch.

This fine species is more nearly allied to *A. gannascus*, Stoll sp., than to *A. strigilis*, in the shape of the primaries, but these are more falcate, the internal margin more sinuate than in either of the hitherto described species of *Ambulyx* from Brazil. The prominent ocelloid spots on the upper surface of the secondaries, offer a specific character which will quickly distinguish the present species from its congeners, and present a remarkable evidence of the intimate relation which the present genus sustains to *Smerinthus*, while the larva of *Ambulyx* is stated by species described under *Ambulyx*, are stated to recede structurally from *A. strigilis* and *A. gannascus*, I am prepared to consider the genus as exclusively American.

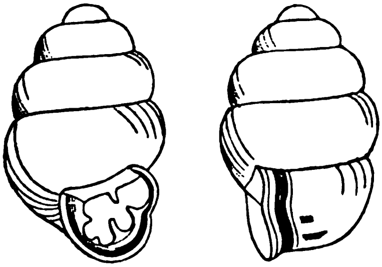
XXVI.—*Descriptions of* New Species *of* Pupadæ.

By Edward S. Morse.

Read November 20, 1865.

Isthmia ventricosa, nov. sp.

Fig. 1.

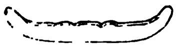


Isthmia ventricosa Morse.

Animal.—Dorsal and cephalic portions of body, and tentacles jet black. Disk long, narrow, rounded at extremity; anterior portion of disk dark slate, becoming lighter towards caudal extremity. Tentacles short, very bulbous; base of tentacles approximating. Cephalic lobes conspicuous.

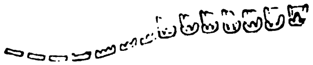
Buccal plate wide, narrow, not produced in centre, but slightly curving at ends; cutting edge regularly waved.

Fig. 2.



Buccal plate of I. ventricosa.

Fig. 3.



Lingual membrane of I. ventricosa.

Lingual formula 98,–13–1–13; central and lateral plates notched at outer posterior corners. Central plate square, having three small denticles. Plate indented at base of central denticle, which is the largest.

Lateral plates tridentate, inner denticle largest. Uncine minutely notched.

Shell.—Umbilicate, ovate conic, smooth, polished; apex obtuse; suture deep; whorls four, convex; aperture semicircular, with five teeth, one prominent on the parietal margin, two smaller on the columellar margin, and two prominent within, contracting the aperture at the base; peristome widely reflected, the right margin flexuose, within thickened and colored.

Length .07 inch; breadth .045 inch.

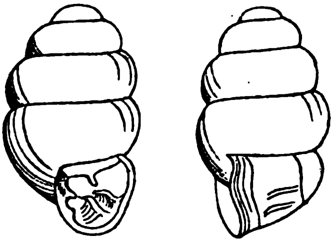
Station.—On dead leaves and twigs in wet places.

Distribution.—Throughout Maine; Concord, N. H.; Mohawk and Greenwich, N. Y.

Remarks.—This species has been confounded with *Isthmia ovata*, which it very much resembles in its general contour; it is one-fourth smaller however, has one whorl less, the columellar margin is more circular. In *I. ovata* the aperture is armed with from seven to eight teeth, always having two and some-

Isthmia Bollesiana, nov. sp.

FIG. 4.

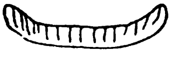


Isthmia Bollesiana Morse.

Animal.—Dorsal portion of body light gray, disk nearly white.

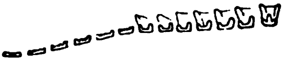
Buccal plate of the same width throughout, slightly rounded at the ends; cutting edge without projections, finely striated.

FIG. 5.



Buccal plate of I. Bollesiana.

FIG. 6.



Lingual membrane of I. Bollesiana.

Lingual formula 88,–12–1–12; central and lateral plates notched at outer posterior corners; central plate square, widening posteriorly, armed with three minute denticles, central one largest; laterals having two minute denticles apart, outer denticle nearly obsolete. Uncine scarcely notched.

Shell.—Minutely perforate, cylindrical ovate, delicately striated, sub-translucent; apex obtuse; suture well defined; whorls four, sub-convex; aperture sub-orbicular, somewhat flattened on its outer edge; with five teeth, one prominent and rather curved on the parietal margin, two similar in form, the lower one the smaller, on the columellar margin, and two slightly elevated lamelliform teeth within and at the base; peristome sub-reflected and thickened.

Length .065 inch; breadth .035 inch.

Station.—Under dead leaves and on bark in hard wood groves.

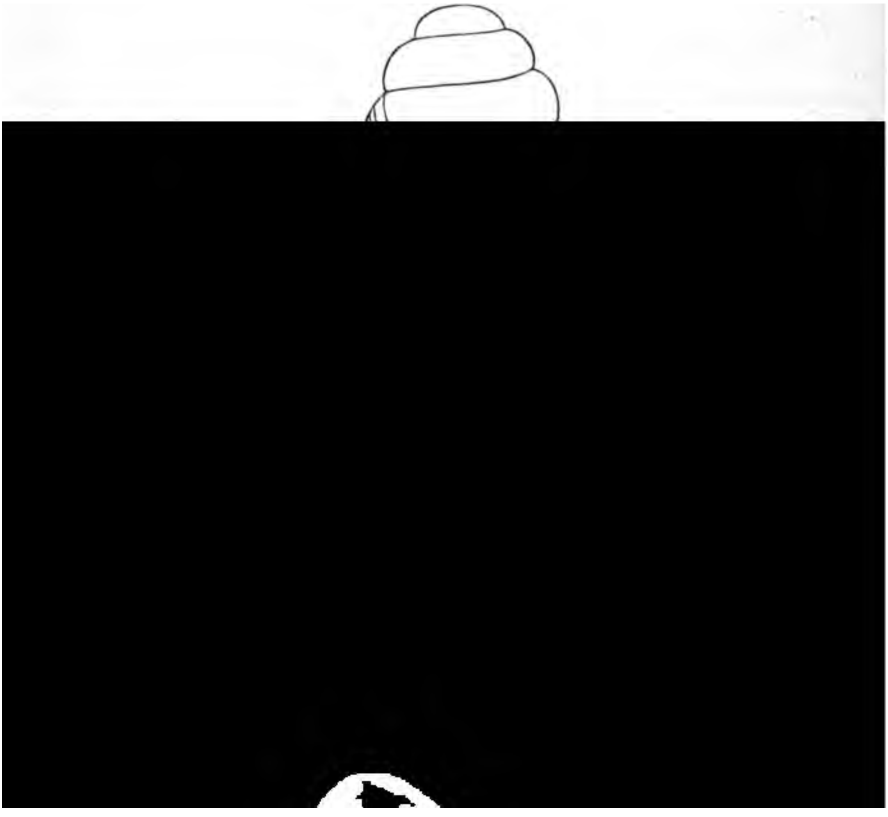
Distribution.—Throughout Maine; also in New Hampshire; Massachusetts; New York; and Norfolk, Va.

Remarks.—Its nearest allied species is *Isthmia Gouldii;* it appears to be intermediate in size between the latter species and *I. milium*. The shell is one fifth smaller than *I. Gouldii*, is lighter colored, more delicate in texture, and not so distinctly striated. The outer lip is not depressed and the aperture is as long as broad; the teeth within the aperture of the shell are less prominent, those at the base of aperture being scarcely elevated. The color of the soft parts, the characters of the lingual dentition and buccal plate are alse quite different.

I take pleasure in dedicating this species to the Rev. E. C. Bolles.

Isthmia corpulenta, nov. sp.

FIG. 7.



Station.—In wet moss.

Distribution.—Little Valley, Washoe Co., Nevada; on E. slope of Sierra Nevada, 6,500 feet above the sea. Collected by R. H. Stretch.

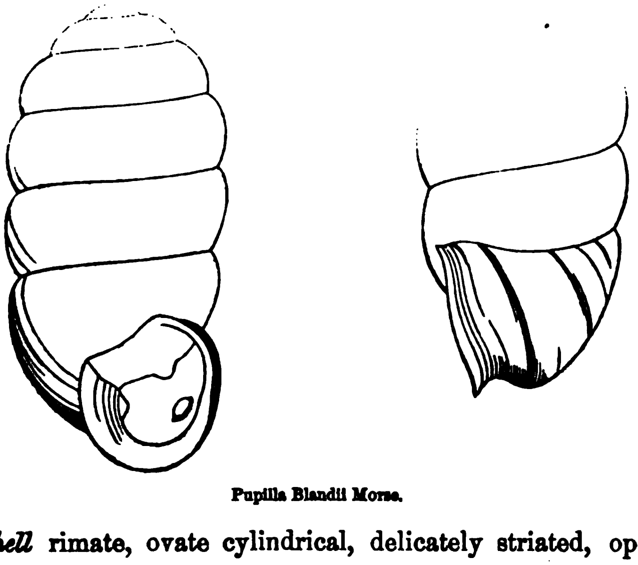
Remarks.—This species bears a slight resemblance to *Isthmia decora*, but differs in being much wider, slightly longer, though having one whorl less, and the aperture very much larger and different in contour.

I am indebted to Mr. Thomas Bland for the privilege of describing this species.

Pupilla Blandii, nov. sp.

Pupa *Blandi*, W. G. Binney; U. S. Explorations in Nebraska. Ex. Doc. 35th Congress 2d Sess., Vol. II. part II., 725, 1859. (Without description.)

Fig. 8.



Pupilla Blandii Morse.

Shell rimate, ovate cylindrical, delicately striated, opake, light brown; apex obtuse, nucleus with microscopic granulations; suture well defined; whorls six, sub-convex, the last ascending at the aperture, rapidly expanding, with an external whitish callus, between which and the peristome there is a deep constriction; aperture small, nearly circular, with three obtuse teeth of about equal size, one on the parietal margin, one on the columellar margin, and the third far within and at the base of aperture; peristome sub-reflected, the margins joined by a thin callus.

Length .13 inch; breadth .06 inch.

Distribution.—Drift on the Missouri River, near Fort Berthold.

Remarks.—This species bears some resemblance in form to *P. badia*, it resembles more closely *P. bigranata* of Europe, but differs from both these species in the characters of the aperture, and more especially in the presence of a tooth at the base of the aperture.

W. G. Binney mentions this by name simply in a list of shells in F. V. Hayden's Report to Lieut G. Warren in the work quoted above. As it has not been mentioned in any of his subsequent writings, we infer that he relinquished his views as to its novelty.

XXVII.—*Notes on Species of the Family* CORBICULADÆ, *with Figures.*

BY TEMPLE PRIME.

(*Continued from page* 92.)

Read April 2, 1866.

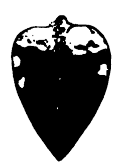
Genus CORBICULA.

30. **Corbicula erosa,** Prime.

Corbicula *erosa*, Prime. Acad. N. S. Phil. Proc. 126. 1861.
Prime Cat. 3. 1863.

C. testa trigona, subæquilaterali, tumidula, solidiuscula; striis irregularibus; epidermide nigro-fuscescente vestita; latere antico producto, rotundato, postico subangulato, obtuso; margine inferiore parum arcuato; umbonibus tumidis, profunde erosis; cardine incrassato; dentibus cardinalibus crassis, distantibus; lunula vix conspicua; margarita violacea.

FIG. 40.



Corbicula erosa.

Long. 20; lat. 18; diam. 12 mill.

Hab.—Cambodia. Collect. Jay, Cuming et Prime.

The shell is trigonal, nearly equilateral, inflated and somewhat solid. The anterior side is produced, the posterior is subangular and obtuse. The inferior margin is somewhat arched. The beaks are large, inflated, and deeply eroded. The interior of the valves is violet. The hinge margin is angular. The hinge is broad and strong. The cardinal teeth are unusually remote from each other. The striæ are irregular, but not much raised. The epidermis is blackish-brown without polish. The lunula is barely perceptible.

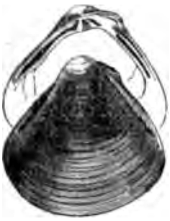
Compared with *Corb. Lydigiana*, the only species to which it is allied, it is less elevated, not so triangular, the striæ are less regular and deeper, and the epidermis is darker and coarser.

31. **Corbicula Lydigiana,** Prime.

Corbicula *Lydigiana*, Prime. Journ. Conchyl. ix. 355. 1861.
Loc. sub cit. x. 388., pl. xiv. f. 8. 1862.
Prime Cat. 3. 1863.

C. testa trigona, triangulari, aequilaterali, tumidula, solidiuscula; sulcis regularibus; epidermide viridi-flavescente, nitente vestita, ad umbones brunnea; lunula ovato-lanceolata; umbonibus magnis, tumidis, obliquis, erosis; pagina interna violacea; latere antico paulo longiore, margine inferiore arcuato; cardine crasso; dentibus cardinalibus inæqualibus; lateralibus crassis.

FIG. 41.



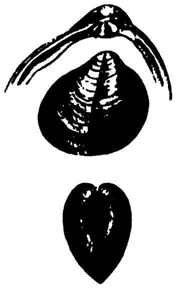
Corbicula Lydigiana.

Long. 23; lat. 20; diam. 15 mill.

Hab.—Siam. Collect. Jay, Cuming et Prime.

32. **Corbicula Pisidiiformis,** nov. spec.

FIG. 42.



Corbicula Pisidiiformis.

C. testa minima, trigona, triangulari, obliqua, inæquilaterali, alta, subinflata; superius conica, inferius arcuata; latere antico producto, postico brevi, subtruncato; umbonibus tumidulis; lunula distincta; striis regularibus, remotis; epidermide viridi-flavescente, nitente vestita; valvis solidis, intus pallide violaceis; cardine incrassato.

Long. 5; lat. 5; diam. 3 mill.

Hab.—Siam. Collect. Wheatley et Prime.

The shell is very small, triangular, inequilateral, and somewhat inflated. The superior portion is conical and the inferior rounded. The anterior side is distended, the posterior is short and somewhat truncated. The beaks are prominent. The lunula is well marked, but not of a distinct color. The striæ are deep, regular, and distant. The epidermis is polished and of a yellowish-green color. The valves are solid, their interior is pale violet. The hinge is robust and broad. Some specimens exhibit a few fine rays of a darker color, running from the beaks to the inferior margin.

The *Corb. Pisidiiformis* is remarkable for being the smallest known species of the genus. In outline and shape it bears great resemblance to certain species of Pisidium. It is closely allied to *Corb. Lydigiana;* irrespective of size, it differs from that species in being more solid, more convex, more conical, less equilateral, and in having heavier striæ.

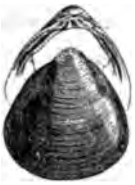
33. **Corbicula triangularis,** Deshayes.

Corbicula *triangularis*, Deshayes.	Proc. Zool. xxii. 345. 1854.
	Biv. Brit. Mus. 234. 1854.
	Prime Cat. 4. 1863.

C. testa trigona, æquilaterali, alta, tumidula, solida; utroque latere

æqualiter declivi; umbonibus prominentibus, violaceo-lividis, vel roseis, violaceo subradiatis; valvis intus supernè rubcescentibus, ad margines violaceis; cardine incrassato; epidermide fuscescente, nitente vestita; striis regularibus, remotis; lunula ovato-lanceolata.

Fig. 48.



C. triangularis.

Long. 17; lat. 17; diam. 11 mill.

Hab.— ? Collect. Cuming et Prime.

The shell is triangular, not much inflated, equilateral, and solid. The beaks are prominent. The striæ are regular, distant, and raised. The epidermis is of a darkish-brown color and polished. The interior of the valves is of a pinkish-red merging into violet towards the margins. The hinge is strong and broad. The lunula is oval, but not distinct in color from the rest of the shell.

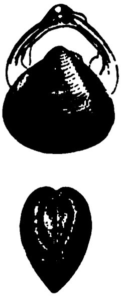
Comparing this species with *Corb. Lydigiana*, we find it to be less inflated, more equilateral, more conical, and transversely less broad, the beaks are also less inflated, and the color of the interior of the valves is different.

The shell is high, inflated, heart-shaped, and slightly inequilateral. The anterior side is rounded and the posterior somewhat obtuse. The valves are solid, the color of the interior is violet, darker on the margins. The beaks are large and prominent, they curve inwardly. The striæ are close and irregular. The epidermis is darkish-brown. The hinge is very broad and solid. The lunula is oval and broad, and of the same color as the rest of the shell.

The specimens from the Tigris, Fig. 45, are apparently the young of this species; they differ from those from Lake Homs, Fig. 44, in being a little more transverse, less inflated, the striæ are more regular and less numerous, the epidermis is green and not brown, and the lunula is less broad and of a lighter color than the rest of the shell; the main characters are, however, the same.

Comparing this species with *Corb. cor.* (Fig. 8) we find that it is much smaller, very much more solid, less transverse, more inflated, and that the hinge is broader and stronger. Young specimens of *Corb. crassula* are somewhat similar to adult examples of *Corb. purpurea* (Fig. 26); they are, however, less transverse, more heart-shaped, more inflated, and the hinge is broader.

Fig. 45.



Corb. crassula.

35. Corbicula Cumingii, Deshayes.

Corbicula *Cumingii*, Deshayes.	Biv. Brit. Mus. 228. 1854.
	Prime Cat. 4. 1863.
Corbicula *squalida*, Deshayes.	Proc. Zool. xxii. 342. 1854.
	Biv. Brit. Mus. 233. 1854.
	Prime Cat. 4. 1863.
Corbicula *notata*, Prime.	Ac. N. S. Phil. Proc. 127. 1861.
	Prime Cat. 4. 1863.

C. testa ovato-transversa, subæquilaterali, tenui, compressiuscula; extremitatibus rotundatis; umbonibus tumidis, prominentibus, incurvis,

oppositis; epidermide nitente viridescente vestita; striis regularibus remotis; cardine angusto; valvis intus violaceis.

Long. 26; lat. 22; diam. 15 mill.

Hab.—Insula Luzon Philippinarum. Collect. Mus. Brit., Cuming et Prime.

The shell is transversely oval, nearly equilateral, rather slight, and somewhat compressed. The lateral extremities are rounded. The beaks are prominent, and they curve inwardly. The epidermis is polished and of a greenish color. The striæ are regular and somewhat distant. The interior of the valves is violet. The hinge is narrow and slight.

FIG 46.

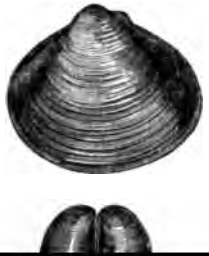
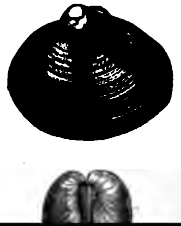


FIG. 47.



The accompanying drawing, Fig. 49, represents a true and constant variety of this species, which differs from the type in being less transverse and much more inflated, the beaks are also more convex and the striæ are more remote.

Fig. 49.

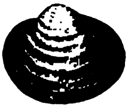
Corbicula Cumingii (varietas).

36. **Corbicula tumida,** Deshayes.

Corbicula *tumida*, Deshayes. Proc. Zool. xxii. 343. 1854.
Biv. Brit. Mus. 229. 1854.
Prime Cat. 4. 1863.

C. testa regulariter ovato-transversa, tumida, tenui, subæquilaterali; posticè paulo longiore, utraque extremitate æqualiter obtusa; umbonibus parvis, turgidulis, incurvis; valvis intus violaceis; striis regularibus valde distantibus; epidermide viridi, nitente vestita; cardine angustissimo.

Fig. 50.



Corb. tumida.

Long. 17; lat. 13; diam. 10 mill.

Hab.—Borneo. Collect. Mus. Brit., Cuming et Prime.

The shell is transversely-oval, inflated, and nearly equilateral. The posterior side is a little the longer. Both lateral margins are obtuse. The beaks are small, but full, and they curve inwardly. The color of the interior is violet. The striæ are regular and very distant. The epidermis is green and polished. The hinge is very narrow and slight.

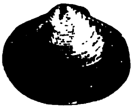
This species is allied to *Corb. occidens* and *Cumingii.* Comparing it with the form of *Corb. Cumingii* described as *Corb. notata* (Fig. 48), we find that it differs in being smaller, less transverse, and more tumid, the beaks are fuller, the sides are more obtuse, the hinge is narrower and more delicate, and the striæ are very much more distant.

37. **Corbicula occidens,** Benson.

Corbicula *occidens*, Benson. Asiatic Journal. Biv. Brit. Mus. 228. 1854.
Prime Cat. 4. 1863.

C. testa ovato-transversa; æquilaterali, tumida, tenui; extremitatibus obtusis; umbonibus tumidis, brevibus, incurvis; lunula ovato-lanceolata, pallida, lævigata; valvis intus profunde violascentibus; epidermide flavescente-viridi, nitente vestita, ad umbones atro-violascente radiata; striis regularibus; cardine angusto.

Fig. 51.



Corb. occidens.

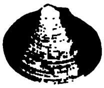
Long. 17; lat. 14; diam. 9 mill.

Hab.—Loco Sikkim dicto, Moredabad, Bengal, Indiæ. Collect. Mus. Brit., Cuming et Prime.

The shell is transversely-oval, equilateral, somewhat inflated, and rather slight. The sides are obtuse. The beaks are moderately inflated, not large, and they curve inwardly. The lunula is oval and of a lighter color than the rest of the shell. The

cente nitidissima, intus alba, in medio macula rubescente notata; umbonibus minimis acutis; cardine angusto.

FIG. 52.



C. Bengalica.

Long. 13; lat. 10; diam. 6 mill.

Hab.—In rivulis Bengalensibus. Collect. Mus. Brit., Cuming et Prime.

The shell is oval, subtrigonal, somewhat compressed, nearly equilateral. The striæ are indistinct, regular, and distant; the epidermis is yellowish and polished. The interior is reddish. The beaks are small and acute. The hinge is narrow and slightly curved. The lunula is very indistinct.

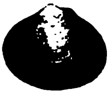
This species is very closely allied to *Corb. pulchella*, of Java; it differs, however, in being transversely longer and in being a little less compressed.

39. **Corbicula trigona,** Deshayes.

Corbicula *trigona*, Deshayes. Proc. Zool. xxii. 344. 1854.
Biv. Brit. Mus. 224. 1854.
Prime Cat. 3. 1863.

C. testa trigona, æquilaterali, compressiuscula, antice paulo latiore et obtusiore, utroque latere æqualiter declivi, transversim tenue et regulariter striata; epidermide viridi, nitente induta, intus pallide violacea; umbonibus minimis, brevibus, acutis; lunula ovata, pallida, lævigata.

FIG. 53.



Corb. trigona.

Long. 14; lat. 11; diam. 7 mill.

Hab.—Pondicherry, Indiæ. Coll. Cuming et Prime.

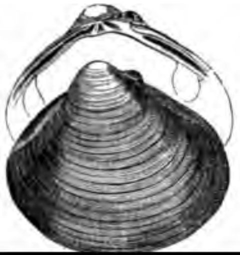
The shell is trigonal, equilateral, and somewhat compressed. The anterior side is broader and more obtuse. The striæ are light, close, and regular. The epidermis is green and polished. The valves are moderately solid. The interior is pale violet. The beaks are small, short, and acute. The lunula is oval and much lighter in color than the rest of the epidermis. The hinge is broad and arched. The anterior lateral tooth is considerably bent towards the end in the neighborhood of the adductor muscle.

Comparing this species with *Corb. striatella* from the same locality, we find it to be more solid, transversely less rounded, and less inflated; the beaks are less swelled and the posterior margin is more abrupt; the hinge is broader and more solid, and the color of the interior of the valves is lighter and not so highly polished.

40. **Corbicula Stimpsoniana,** nov. spec.

C. testa trigona, obliqua, subæquilaterali, inflata; latere antico rotundato, postico longiore, obtuso; umbonibus magnis, tumidis, approximatis, incurvis; valvis solidis, intus candidis, ad margines violaceis; epidermide castanea subnitente vestita; sulcis regularibus distantibus; cardine incrassato; lunula inconspicua, ovato-lanceolata.

FIG. 54.



Long. 34; lat. 25; diam. 17 mill.

Hab.—? Coll. Prime.

in which this species is found, but have very little doubt as to its coming from some part of Asia.

I take much pleasure in the dedication of this species to Dr. Wm. Stimpson.

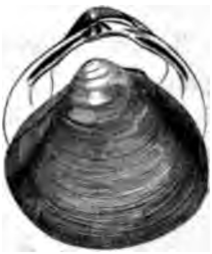
41. **Corbicula vulgaris**, nov. spec.

C. testa trigona, subæquilaterali, compressiuscula; latere antico longiore, rotundato, postico obtuso; umbonibus brevibus, approximatis, incurvis; densè et irregulariter striata; epidermide olivacea subnitente induta; lunula lævigata; pagina interna pallide violacea, ad margines pallide castanea; cardine incrassato.

Long. 27; lat. 25; diam. 16 mill.

Hab.—? Collect. Prime.

Fig. 55.



Corbicula vulgaris.

The shell is trigonal, subequilateral, and somewhat compressed. The anterior side is produced and rounded, the posterior is short and obtuse. The beaks are small and approximate, and they curve inwardly. The striæ are fine, numerous, and irregular, more especially so on the posterior end. The epidermis is of a light olive color. The lunula is not conspicuous, though lighter than the rest of the shell. The interior of the valves is of a pale violet and light chestnut on the margins. The hinge is broad and curved.

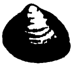
This species, which comes probably from China, is very closely allied to both *Corb. Largillierti* and *Corb. sulcatina.* Compared with *Corb. Largillierti* it is smaller, less inflated, and the beaks are not so large, nor so much swelled, the color of the epidermis also is not the same.

It differs from *Corb. sulcatina* in being more oblique, and in being transversely much shorter; the hinge margin is also much more curved.

42. **Corbicula Quilonensis,** Benson.

Corbicula *Quilonensis*, Benson. 1860.

Fig. 56.



C. Quilonensis.

C. testa minuta, trigona, cuneiformi, compressiuscula, inæquilaterali; latere antico breviore, rotundato, postico longiore, dilatato, angulato; umbonibus brevibus; striis distantibus; epidermide fusco-flavescente vestita; cardine incrassato.

Long. 9; lat. 7; diam. 4 mill.

Hab.—Quilon, Madras, Indiæ. Collect. Benson, Wheatley, et Prime.

The shell is small, trigonal, inequilateral, and somewhat compressed. The anterior side is shorter and rounded, the posterior is longer, produced, and angular. The beaks are small. The striæ are distant. The epidermis is dark yellow. The hinge is comparatively broad and strong.

43. **Corbicula Africana,** Deshayes.

Cyrena *Africana*, Krauss. Moll. Sud. Africa, 8, pl. 1, f. 8. 1848.
Cyrena *Gauritziana*, Krauss. in litt. 1848.

Hab.—In fluviis Umpingano, Gauritz, Lepenulla et Caput Natal, Africæ Meridionalis. Collect. Mus. Stuttgardt; Mus. Stockholm et Prime.

The shell is orbicular, trigonal, compressed, and nearly equilateral. The anterior side is broader and more obtuse. The striæ are close and regular. The epidermis is of a light greenish olive color and polished. The interior of the valves is purplish-violet. The beaks are small, acute, and somewhat raised. The lunula is a little lighter in color than the rest of the shell.

The original describer of this species, Dr. Krauss, is in error in referring it to the *Corb. radiata* and *pusilla*, as may be seen by a comparison of the *Corb. Africana* with these species. The *Corb. pusilla* is more globose, more trigonal, it is smaller, the coloring is different, the beaks are much fuller, and the hinge is much broader and more curved. The *Corb. radiata* is smaller, more globose, less trigonal, the coloring is not the same and the hinge is more rounded.

44. **Corbicula ducalis**, Prime.

Cyrena *fluminea*, Mousson. Moll. Java, 87, pl. xx. f. 3. 1848.
Philippi. Abbild. II. 76, pl. 1, f. 3. 1847.
Corbicula *ducalis*, Prime. Bost. Soc. Nat. Hist. Proc. viii. 274. 1862.
Prime Cat. 4. 1863.

C. testa ovato-trigona, obliquè inæquilaterali, tumida, utraque extremitate æqualiter obtusa; epidermide olivaceo-flava, nitente vestita; striis

Fig. 58.

Corbicula ducalis.

validè distantibus; umbonibus inflatis, obtusis; valvis crassis, intus pallido roseis, ad dentes laterales violaceis; cardine lato.

Long. 19; lat. 16; diam. 12 mill.

Hab.—Java. Collect. Prime.

The shell is oval-trigonal, obliquely inequilateral and tumid. The sides are obtuse. The epidermis is olive-yellow and polished. The striæ are very distant and coarse. The beaks are inflated and obtuse. The valves are thick. The interior is pale rose color, with violet on the lateral teeth. The hinge is very slightly curved and broad.

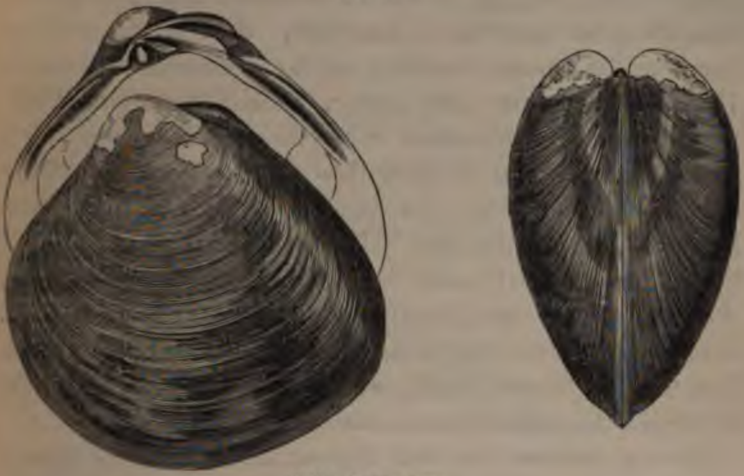
Compared with *Corbicula gracilis* from the same locality, this species is less inflated, less rounded in outline, the striæ are more distant, and the epidermis is lighter in color and less highly polished.

45. **Corbicula Woodiana,** Deshayes.

Cyrena *Woodiana*, Lea. Trans. Amer. Phil. Soc., V. 110, pl. xviii. f. 55. 1832.
Cyrena *similis*,* Gray. Griffith's Cuvier, pl. xx. f. 2. 1834.
Corbicula *Woodiana*, Deshayes. Biv. Brit. Mus. 225. 1854.

The shell is large, orbicular-trigonal, somewhat compressed and subequilateral. The anterior side is rounded and obtuse, the posterior is more produced and angular. The beaks are prominent and approximate, and they curve inwardly. The ligament is short and narrow. The epidermis is polished but variable in color; it is dark green, blackish-chestnut, or yellow. The valves are solid. The interior is white with yellow on the margins. The striæ are irregular. The hinge is angular and narrow.

Fig. 59.



Corbicula Woodiana.

This species, the largest known of the genus, has, as may be seen by the above synonymy, received quite a number of names. Thanks to the kindness of Mr. Lea, the describer of the original *Cyrena Woodiana*, I have been able to examine his type and thereby to institute the necessary comparisons with the different synonyms. The *Corbicula Woodiana*, I will remark, exhibits great change in the color of the epidermis, hence I think the numerous mistakes that have been made concerning it. The type, the largest specimen I have seen of the species, has an epidermis of a dark chestnut color which is highly polished.

Passing in review the synonyms, I will begin with the first in the series, the *Cyrena similis*, Gray. I have never seen this shell, and judging from the figure alone, there being no description, I should say that it differed from the type in so far only that it is green and that it is smaller. It is necessary to say here that the *Cyrena similis* is not to be confounded with the *Venus similis* of the same author, which is figured in Wood's Index; and in conjunction with this immediate subject it is not inappropriate to quote here a few lines from a letter addressed to me some years ago by Mr. Sylvanus Hanley of London. Mr. Hanley says, "Having examined the supposed type I can assert (I erred in trusting Gray in my edition of Wood) that Gray has given the same name to two widely differing species. In 1828 he first published the one in the Index Test. Suppl. (*Venus similis*), and in 1834 in Griffith's Cuvier he figured the other (*Cyrena similis*)."

Having assumed the shell figured in Griffith, the *Cyrena similis*, to be the *Corbicula Woodiana*, we must necessarily regard the one figured in Wood's Index, the *Venus similis*, as different. What the *Venus similis* really is will be discussed, I hope, at some future time.

In conclusion I will add that the *Corbicula Woodiana* does not seem to be very closely allied to any of its congeners; on the contrary, its size and general external appearance bring it into very close proximity with certain species of Cyrena.

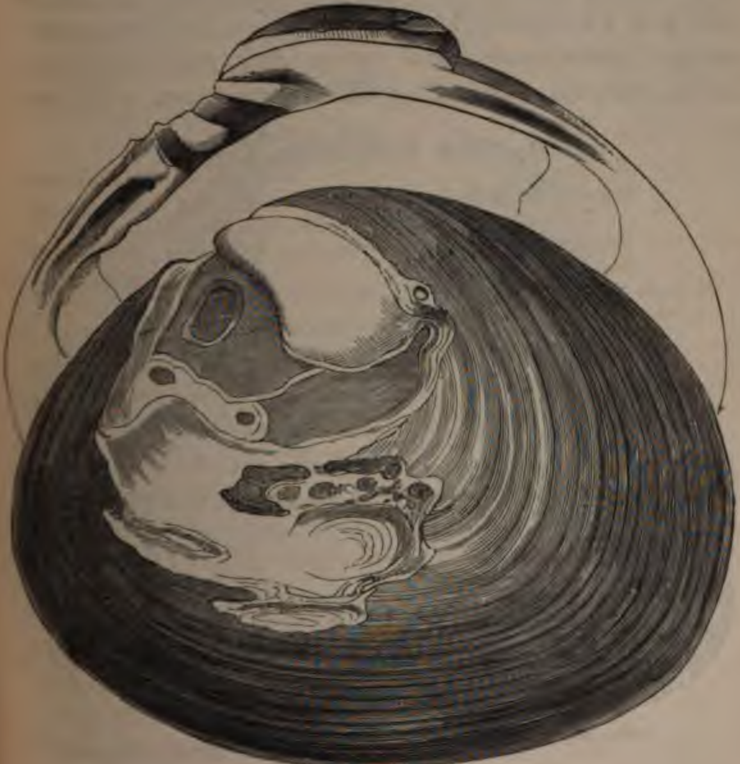
Genus BATISSA.

2. **Batissa similis,** Prime.

Batissa *similis*, Prime. Annals N. Y. Lyceum Nat. Hist., vol. vii. 112. 1859.
Prime Cat. 5. 1863.

B. testa maxima obovata, inæquilaterali, solida, compressiuscula; latere antico brevi, rotundato, postico latiore; umbonibus obliquis;

Fig. 60.



Batissa similis.

epidermide atro-fuscescente vestita; valvis intus albis ad margines inferne posticeque violaceis; cardine incrassato.

Long. 97; lat. 78; diam. 40 mill.

Hab.—Nicobar. Collect. Prime.

The shell is large, transversely oval, inæquilateral, heavy, and somewhat compressed. The anterior side is short and rounded, the posterior is broader. The beaks are placed obliquely. The epidermis is blackish. The interior of the valves is white with violet on the inferior and posterior margins. The shell is moderately broad and strong.

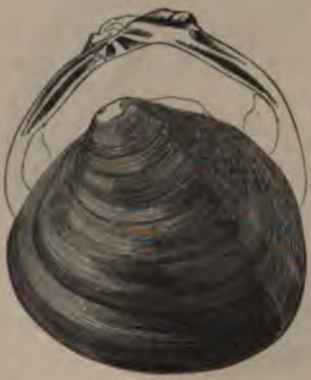
Comparing this species with *Batissa Keraudrenia* we find that it is transversely longer and smaller, that the posterior margin is more rounded, and that the primary teeth are broader and shorter; the color of the epidermis, moreover, is different.

3. **Batissa triquetra,** Deshayes.

Batissa *triquetra*, Deshayes. Proc. Zool. xxii. 13. 1854.
Biv. Brit. Mus. 236. 1854.
Prime Cat. 5. 1863.

B. testa parva, trigona, obliqua, inæquilaterali, compressiuscula; margine antico dilatato, postico obtuso, inferiore vix arcuato; umbonibus brevibus; valvis tenuibus intus albis; epidermide nigro, viridescente vestita; cardine angusto, dentibus lateralibus elongatis, angustis, subæqualibus.

Fig. 61.



Batissa triquetra.

Long. 39; lat. 36; diam. 11 mill.

Hab.—Insulæ Philippinenses, Australia. Collect. Cuming et Prime.

The shell is small, trigonal, oblique, inequilateral, and somewhat compressed. The anterior margin is produced, the posterior is obtuse, and the inferior rounded. The beaks are small. The valves are delicate and the color of the interior is violet. The epidermis is blackish-green. The striæ are obsolete. The hinge is narrow and slight. The lateral teeth are long, narrow, and subequal.

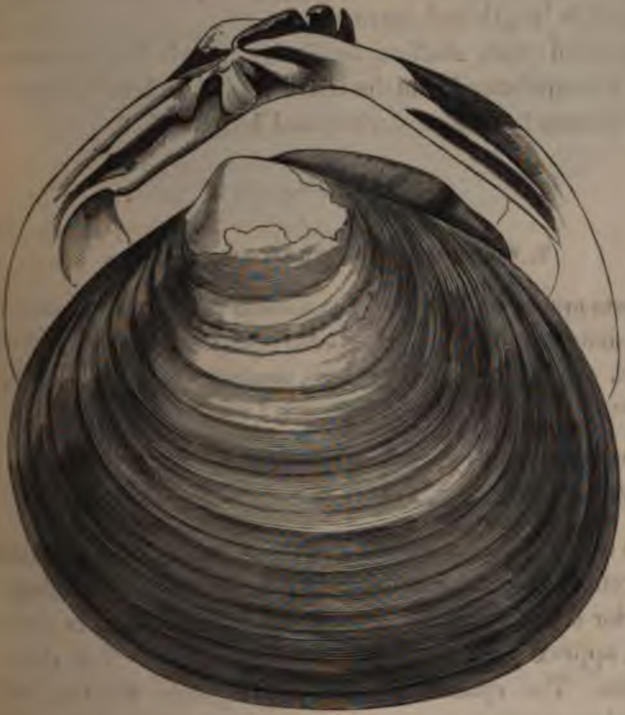
The *Batissa triquetra* is somewhat allied to *Batissa Childrenæ* from the Philippines; it is, however, fuller, more trigonal, transversely shorter, and more delicate.

4. **Batissa ponderosa,** Prime.

Batissa *ponderosa*, Prime. Bost. Soc. Nat. Hist. Proc. viii. 273. 1862.
Prime Cat. 5. 1863.

B. testa ovato-orbiculari, obliquè inæquilaterali, ventricosa, crassa, solida; latere antico rotundato, postico latiore, obtuso; umbonibus par-

Fig. 62.



Batissa ponderosa.

vulis; ligamento crasso; striis irregularibus; epidermide nigro-virescente vestita; valvis intus albis infernè posticèque purpureo-violaceis; cardine crasso, lato; dentibus lateralibus subæqualibus, elongatis.

Long. 83; lat. 74; diam. 43 mill.

Hab.—Nova Caledonia. Collect. Cuming et Prime.

The shell is oval, orbicular, obliquely inequilateral, ventricose, heavy, and solid. The anterior side is rounded, the posterior is broader and obtuse. The beaks are small. The ligament is broad. The striæ are irregular and coarse. The epidermis is greenish black. The interior of the valves is white, with purplish violet markings on the inferior and posterior margins. The hinge is thick and broad. The lateral teeth are subequal in length and narrow.

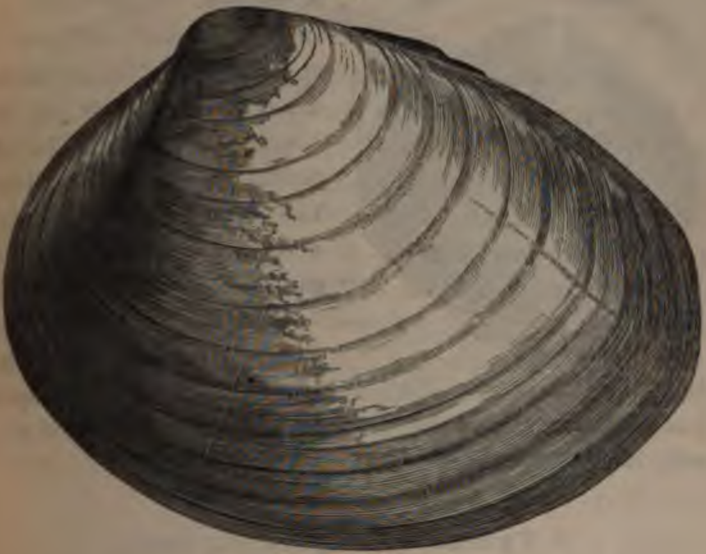
Compared with *Batissa lenticularis*, it is larger, more trigonal, less equilateral, and the beaks are less inflated; moreover the epidermis is coarser, darker, and less polished.

Genus CYRENA.

7. **Cyrena Mörchiana**, nov. spec.

Somewhat similar to *Cyrena ventricosa*, from the Philippines, from which it differs, however, in being transversely longer, more inflated, and more inequilateral.

FIG. 63.



Cyrena Mörchiana.

I am indebted to Mr. Lea for being able to describe this interesting species, which I take great pleasure in dedicating to Prof. Mörch of Copenhagen.

8. **Cyrena laevis,** Prime.

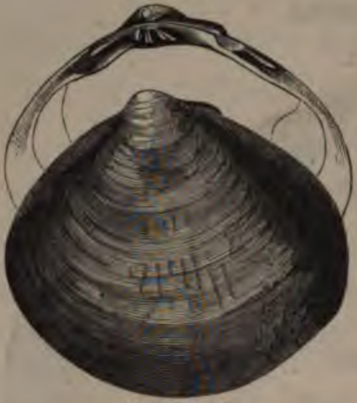
Cyrena *lævis*, Prime. Acad. N. S. Phil. Proc. 125. 1861.
Prime Cat. 6. 1863.

C. testa orbiculato-trigona, compressa, inæquilaterali, lævis; latere antico rotundato; margine superiore convexo, inferiore arcuato; umbonibus parvis, depressis, obliquis, approximatis; valvis tenuibus, intus candidissimis; striis obsoletis; epidermide viridi, nitente vestita; cardine angusto.

Long. 46; lat. 42; diam. 22 mill.

Hab.—Borneo. Collect. Prime.

Fig. 64.



Cyrena laevis.

The shell is orbicular, trigonal, compressed, inequilat and light. The anterior is rounded. The superior gin is convex and the infe is curved. The beaks small, depressed, oblique, approximate. The valves delicate, the color of interior is white. The dermis is green and polis The striæ are more or less solete. The hinge is nar and slight.

This species is very clo allied to *Cyrena nitida*, f the same locality, of which it is very possible it may be young; it differs in being smaller, more compressed, and g rally more delicate.

9. **Cyrena triangularis**, Metcalfe.

Cyrena *triangularis*, Metcalfe. Proc. Zool. xix. 74. 1851.
Biv. Brit. Mus. 242. 1854.

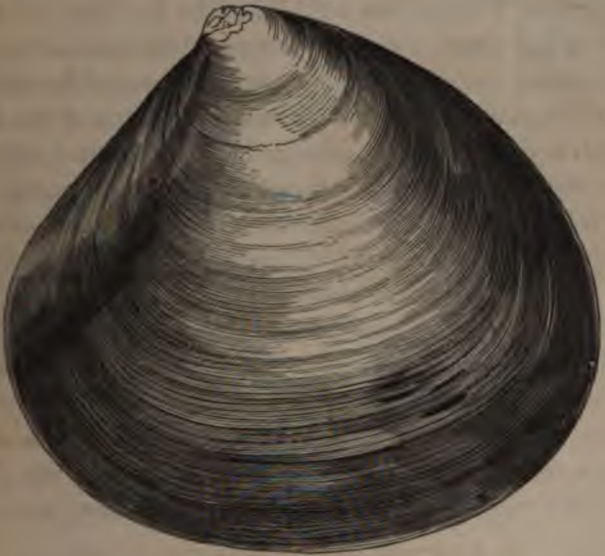
C. testa orbiculato-trigona, solida, compressiuscula, subæquilate margine anteriore rotundato, posteriore subobtuso, superiore angu inferiore arcuato; umbonibus brevibus, approximatis; valvis cr intus candidis; striis irregularibus, epidermide fusco-virescente ves cardine lato, anguloso.

Long. 80; lat. 74; diam. 44 mill.

Hab.—Borneo. Collect. Metcalfe et Prime.

The shell is orbicular-trigonal, solid, somewhat compres and subequilateral. The anterior margin is rounded, the terior somewhat obtuse, the superior angular, and the infe rounded. The beaks are small and approximate. The va are thick, and the color of the interior is white. The striæ are irregular. The epidermis is dark green. The hinge is broad and angular.

Fig. 65.



Cyrena triangularis.

The remarkably triangular outline of this species renders it very distinct from all others of the same genus.

Genus VELORITA.

Cyrena, Gray, 1825.—Venus, Gray, 1828.—Velorita,* Gray, 1834.

Animal. Not observed.

Shell trigonal, higher than broad, heart-shaped, thick, inflated, posteriorly angular; hinge broad, thick, three unequal cardinal teeth, compressed, somewhat oblique, anterior tooth in the right valve very short, posterior tooth in the left valve obsolete; lateral teeth very unequal, anterior tooth thick, short, transverse, very close to the hinge, posterior tooth elongate, lightly striated, remote from the hinge; muscular impressions rounded, equal; palleal impression ending in a very short sinus; ligament short, narrow.

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* Griffith's Cuvier, pl. 1, f. v. 1834.

The genus Velorita was established by Mr. Gray for a shell which he had previously described under the name of Cyrena; it differs very materially from the other genera of the family in its exterior shape and in the peculiar formation of the hinge. The valves are very thick, oblong, the beaks heart-shaped, and the lunula is generally distinct and convex in the centre. The hinge is broad, it has three cardinal teeth, all inclined obliquely towards the posterior side; the anterior lateral tooth is very thick, prominent, and is placed very close to and at a right angle with the anterior cardinal tooth, the posterior lateral tooth is long, somewhat narrow, and to a certain extent similar to that of Corbicula.

Up to the present time we knew of but one species of this genus, a recent one supposed to come from Japan, the *V. Cyprinoides;* we now have the satisfaction of adding another to the list.

M. Deshayes, who does not admit the validity of this genus,

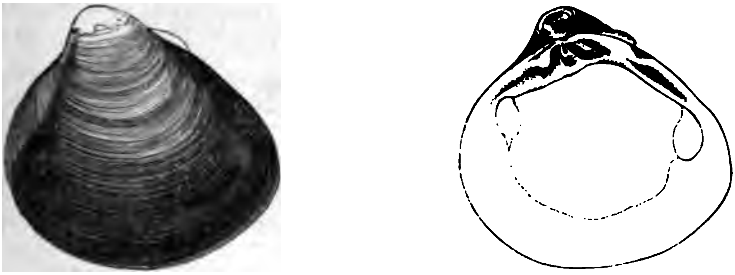
nigro-fuscescente, nitente vestita; valvis intus albis vel roseis; sinu palliari brevi.

Long. 37; lat. 35; diam. 14 mill.

Hab.—Cochin, Indiæ. Collect. Hanley, Shurtleff et Prime.

Larger than the *Velorita Cyprinoides.* Mr. Hanley, who kindly identified the specimens in my cabinet, says of the *Velorita Cochinensis*: "A few individuals of this strongly marked species were sent from the Malabar coast. In external aspect the shell somewhat resembles the *Velorita Cyprinoides.* The primary teeth are somewhat peculiar, and have a tendency to shelve outwards; the hinder and central ones are not strictly bifid, but exhibit a kind of shallow sublateral grooving; the front one in the right valve is very short, and simply pyramidal. The beaks are probably acute when young; the surface below the epidermis is reddish-purple."

Fig. 64.



Velorita Cochinensis.

ical Register for 1865, kept in the City of New York.

ROFESSOR ORAN W. MORRIS,

ork Institution for the Deaf and Dumb.

Read February 1866.

ermometer.			Rain & Snow.	Force of Vapor.			Relative Humidity.			Prevailing Wind.
M	9 P. M.	Mean.		7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	
2	39.0			.231	.271	.850	100.0	100.0	100.0	
0	16.0	26.59	3.40	.030	.050	.038	43.1	43.1	49.2	N.W. 14
0	46.0	32.857	4.06	.305	.347	.298	96.1	100.0	100.0	
6	15.0			.040	.007	.054	38.8	18.8	38.6	N.W. 12
0	64.0	45.617		.467	.608	.519	100.0	96.8	96.2	
0	25.5		8.32	.076	.094	.081	49.4	34.8	85.0	W. 10
5	68.0	54.476		.445	.646	.505	100.0	100.0	100.0	
0	43.0		4.14	.171	.166	.152	52.7	27.0	39.9	S.E. 12
5	79.2			.578	.772	.648	96.5	92.9	97.0	
0	48.0	63:075	5.56	.240	.264	.297	51.9	45.1	57.5	S.E. 8
0	81.0			.909	1.077	.981	92.7	89.5	94.3	
5	59.1	77.127	10.42	.406	.575	.517	64.4	51.5	59.1	S.W. 10
0	88.8			.896	1.067	.896	89.3	80.2	90.8	
5	67.5	78.280	5.21	.475	.472	.425	54.8	44.8	56.3	W. 10
0	84.0			.856	1.197	1.016	91.2	86.1	90.9	
8	59.7	76.780	2.23	.356	.472	.292	61.8	41.0	56.8	W. 16
2	84.0			.884	1.101	1.016	97.0	94.9	100.0	
5	50.8	72.714	4.21	.809	.808	.348	64.1	58.8	61.9	W. 8
0	69.2			.494	.677	.526	93.2	92.6	93.4	
7	42.3	58.976	4.94	.140	.192	.191	45.9	44.5	52.2	N.W. 12
5	61.5			.421	.586	.698	95.7	92.9	96.2	
5	32.7	45.716	4.19	.128	.160	.108	71.9	54.3	5[illegible].2	N.W. 11
0	58.0			.888	.411	.426	96.2	100.0	96.7	
0	23.0	38.890	6.80	.037	.038	.072	31.6	21.5	51.5	N.W. 9
0	84.0	78.28	10.42	.909	1.197	1.016	100.0	100.0	100.0	
0	15.0	26.59	2.23	.030	.007	.038	31.6	18.8	35.0	
0	69.0	51.69	8.19	.879	1.190	.978	68.4	81.2	65.0	N.W. 34
e.				1.197	Aug.		100.0	Jan. etc.		
-				.007	Feb.		18.8	Feb.		
				1.190			81.2			
		55.508								
			62.98							

January.—It snowed on the 3, 14, 16, 17, 19, and 24th. Rain and snow on the 7th. Rain 6, 10, and 28d. Aurora Borealis seen on 16th. Parhelia on the 2d and 16th. Lunar haloes, 2, 9, and 18th. Solar haloes on the 13th and 31st. A Meteor on the 13th.

February.—It snowed on the 1, 3, 5, $\overset{3}{10}$, 12, 19, and 28th. Rain and snow 7, and 15th. Rain 4, 8, 25, and 26th. Aurora Borealis seen on the 21st. Solar halo 27th.

March.—It snowed on the 1st. Snow and rain 2d and 24th. Rain 3, 4, 8, 9, 10, 15, 16, 17, 20, 21, 22, 23, 30, and 31st. Thunder and lightning 31st. Lunar haloes 12th and 13th.

April.—It rained on the 1, 6, 7, 9, 10, 11, 12, 13, 15, 16, 18, 20, 21, 22, and 29th. Thunder shower on the 29th. Lunar halo observed on the 6th.

May.—It rained on the 1, 5, 6, 8, 9, 11, 12, 14, 18, 19, 20, 21, 22, 27, 28, and 29th. Thunder showers, 5, 6, 8, and 11th. Solar haloes observed on the 4th and 8th. Lightning 17, 21, and 22d. A Tornado on the 11th.

June.—It rained on the 5, 8, 9, 10, 19, 20, 21, 22, 26, and 30th. Thunder showers on the 5, $\overset{2}{8}$, $\overset{4}{9}$, $\overset{2}{10}$, 18, 22, and 30th. $\overset{2}{\text{Lightning}}$ seen on the 4th. Aurora Borealis 16th and 22d.

July.—It rained on the 1, 4, 12, 16, 17, 19, 20, 22, and 25th. Thunder showers on the 1, 4, 17, 19, 22, and 25th. Lightning seen on the 20, 22, 25, and 28th. Lunar halo 6th. Parhelion 29th.

August.—It rained on the 1, 3, 4, 6, 7, 21, 22, and 27th. Thunder showers 3, 4, and 21st.

September.—It rained on the 1, 2, 6, 8, 10, 14, 18, and 25th. Thunder showers 2d and 6th. Lightning seen 15th and 25th. Shooting stars 6th.

October.—It rained on the 1, 4, 14, 15, 16, 18, 19, 20, 27, 28, and 31st. Very high wind 19th and 20th. Lunar halo seen on the 31st. Aurora Borealis 20th. Shooting stars 22d.

November.—It rained on the 2, 3, 4, 17, 20, 21, 22, 23, and 27th. Snowed on the 29th. Slight hail 22d. Aurora Borealis seen on the 10th and 11th. Lunar halo 27th. Shooting stars 15th.

December.—It snowed on the 7, 9, 16, 17, 20, 30, and 31st. Snow and rain 24th. Rain 1, 4, 12, 13, 19, 21, 27, and 28th. Lunar halo seen on the 29th. Shooting star 21st.

The Aurora Borealis was observed 7 times; Parhelia 3 times; Meteors 5 times; Solar haloes 5 times, Lunar haloes 10 times; Hurricanes 3 times; Lightning alone 10 times. It rained on 116 days, among which were 29 thunder showers. It snowed on 22 days; snow and rain 6 days; and hail on one day.

The quantity of water that fell in June was more than in any other month of the year, 10.42; March coming the nearest to it, 8.32; while the whole for the year was greater than for many years; the average for the 11 years preceding being 50.447 inches, including 1865, 51,491 inches; the greatest quantity in any one year, for the same time, being 57.03 inches in 1863, while this year it was 62.98 inches.

XXIX.—*Notes on the Embryology of Starfishes.*

(TORNARIA.)

By ALEXANDER AGASSIZ.

Read February 12, 1866.

THE Tornaria here described, Pl. II. Figs. 1–11, has been known to me several years. I did not include it in my former papers on the Embryology of Echinoderms in hopes of ascertaining the Starfish of which it is the Pluteus; as there is no probability of determining this for the present, I have been induced to publish these incomplete observations, since they throw considerable light on the structure of a type of Echinoderm larvæ very imperfectly known. Müller has given us figures and descriptions of species of Tornaria found at Nice, Marseilles, and Triest;* the stages he has observed correspond very closely to those I have found, which may be considered as explanatory of his figures, and show more in detail how we can recognise in them all the characteristic features of Starfish Larvæ.

larvæ (Tornaria) and the larvæ known to give rise to true Starfishes (Brachiolaria), that it will be a matter of the utmost interest in the study of Echinoderms to determine the genus of Starfishes to which Tornaria belongs. The presence of an anal ring of vibratile cilia analogous to that of Pneumodermon, with which I have had frequently the opportunity of comparing it, and the peculiar nature of the water system, are features utterly unlike those of any other Echinoderm Pluteus.

The changes of outline of Tornaria, with advancing development, are by no means to be compared with the extraordinary transformations characteristic of the development of a Pluteus or a Brachiolaria. The youngest plutean forms observed by Müller* can readily be recognised as forming part of the same cycle of development with the adult Tornaria. While the young Sea-Urchin or Ophiurean or Asteracanthion Pluteus cannot be recognised as such until the connecting links are traced.

The general form of our Tornaria is cylindrical with a slightly conical base and summit (Figs. 3, 8). They always retain their cylindrical outline, and do not become flattened with increasing age as Brachiolaria and other plutean stages of Echinoderms. On comparing the young Tornaria, Fig. 1, with a young Brachiolaria, Fig. 11, we readily recognise the anal (*v*) and oral (*v'*) plastrons, with the broad horseshoe-shaped groove between them (*g*) in which the mouth (*m*) opens. The oral plastron laps over the opening of the mouth, concealing it entirely; this is best seen in profile (Figs. 3, 8 *m*). The vibratile chords which bind the plastrons resemble the chords of the Brachiolaria in their earlier stages, and the only tendency we have towards the formation of arms are the slight projections (*e e' e''*, Figs. 3, 6, 8) on the sides of the anal and oral chords. The chords do not extend simply on the edge of the plastrons; towards the oral extremity we find both the oral and anal vibratile chords forming on the surface of the body well marked loops (Figs. 1,

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* See Müller. Memoir II. Plate 5.

2, 6, 7, *l l'*), and uniting on either side of the oral extremity (Figs. 3, 8), where we have two very prominent chocolate-colored pigment spots (*f*, Figs. 1, 2), the homologue of the brachiolar pigment spots of Brachiolaria. The vibratile chords are quite thin, and the loops would be barely perceptible as their continuation were it not that the pigment cells, so generally distributed along their course in all Echinoderm larvæ, retain an unusual prominence (Fig. 4). These loops appear on the oral surface of the Pluteus (Figs. 1, 2) like short oral arms projecting beyond the outline; as the Tornaria grows older (Figs. 6, 7) the middle arm (*f*) becomes the most prominent.

Besides the two vibratile chords (*v*, *v'*) which can readily be recognised as identical with the anal and oral chords of the Brachiolaria, we have a vibratile chord (*v''* Figs. 1, 2, 3) of an entirely different nature. It forms a complete circuit round the body of the Pluteus (Fig. 5 *v''*) and in the centre of it opens the anus. It is covered like the others with brilliant pigment spots, but the cilia forming the chord are large and powerful, and can readily be distinguished as single threads without producing the peculiar optical phenomenon of vibratile cilia, a common feature in the embryos of Mollusks already observed by Müller.

mouth (*m*), in the deep horseshoe-shaped groove (*g*) separating the anal and oral plastrons; this groove flares out somewhat towards the edges and gradually grows thinner on the aboral side (Figs. 2, 7, *g*) where it terminates.

The water system in the young Brachiolaria (*w*, Fig. 11) forms the principal part of the body of the Pluteus extending Y-shaped, so as to inclose within its shanks the whole digestive cavity, and opening externally on the aboral side, through the water-pore. In the youngest Tornaria (Figs. 2, 3) the water system consists of a single conical cavity opening outwards through a long tube at *b* (Figs. 2, 3), sending out two short processes inclosing the œsophagus at its junction with the stomach and attached to the oral extremity by a strong muscle (*m'*), the two short processes of the conical water system are the only trace of the marked Y-shaped cavity which incloses the whole of the œsophagus in the Brachiolaria. The opening (*b*) of the madreporic canal is situated slightly on one side of the median line (Figs. 2, 7, *b*).

The mode of formation of the water system, though I have not traced it, is probably similar to that of the Brachiolaria, as a diverticulum of the digestive cavity; its further increase, however, takes place in a very different manner. Owing to the early development of the œsophagus in the young Brachiolaria, the earlets of the water system become separated and only ultimately join again by extending on each side beyond the mouth,* and thus form the Y-shaped system which then gradually extends and incloses the stomach within its anal branches. In the Tornaria the œsophagus does not take this extraordinary development when compared to the remainder of the digestive cavity; hence the water system remains united as a single cavity, most probably pushing its way out to the surface and communicating outwardly by means of the water pore (*b*) in the same manner as in Brachiolaria.

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* See my paper on the Embryology of the Starfish, p. 17.

We find besides, in somewhat more advanced stages than Figs. 1 and 2, in Fig. 3, at the anal extremity of the stomach two independent bodies placed on each side of it (*w′ w″*, Figs. 3, 5, 10) resembling the water system of the young Brachiolaria in a similar stage of development. These bodies are undoubtedly part of the water system, as in more advanced stages they have united (Figs. *w′ w″*, 6, 7, 9) and have increased in size towards the oral extremity, and eventually unite with the large portion of the water system (*w*) already formed at the oral extremity. I have not followed this junction, although there seems but little doubt that it does take place, as can be readily seen in the good figure of a Tornaria given by Müller in his Sixth Memoir, Plate 9, which is somewhat older than any I have observed,* to judge from the state of the water system. I have frequently traced the junction of the separate bodies *w′ w″* of Figs. 3 and 10 till they had taken the shape of *w′ w″*, Figs. 7 and 9. It would follow from this that the anal part of the water system of Tornaria is developed independently from the oral portion, these separate parts eventually forming a junction; this is similar to the separate development of the right and left branches of the Y-shaped water system in Brachiolaria. The jecting beyond the general outline as in the adult Brachiolaria, but remain always, in the most advanced specimens observed, in an embryonic condition (*e e'*, Figs. 6, 8), as rudimentary arms at the extremities of the horseshoe-shaped groove, which divides the anal and oral plastrons. We find in older larvæ quite well marked epaulettes (*e' e'*, Figs. 6, 8) which are, as I have shown already for Toxopneustes, in my paper on the Embryology of Echinoderms,* only dilatations of the vibratile chord, and not special organs of locomotion as Müller had been induced to consider them.

The prominent characters of Tornaria can be summed up in the permanence of the embryonic features of Brachiolaria, and it will be a curious point to ascertain whether this embryonic type gives rise to what I have been induced from embryological data to consider the lower types of Starfishes, such as Luidia, Ctenodiscus, and Astropecten. It will be most interesting to observe also how far the larvæ of types, which are shown to retain embryonic features of some adult, have themselves embryonic features of their larvæ. Comparisons of this kind have not as yet been attempted, and promise to afford valuable aid for classification. The presence of a single cavity of the water system at the oral extremity of the Tornaria throws additional light on the nature of the circulating cavity observed between the rudimentary arms of Echinaster embryos. It requires but very slight modifications to transform our Tornaria into a larva similar to the Echinaster embryo with its three club-shaped arms; imagine the whole of the anal extremity of the Tornaria occupied by a small pentagonal Echinoderm, as in Echinaster, and we have short rudimentary appendages left, inclosing a cavity in which a circulation could easily be perceived; the opening, *b*, of this cavity being placed on the edge of the young Echinoderm, as in our Asteracanthion embryo, would readily escape notice. We have thus an additional link to show that the development of Cribrella is only a modified plutean development, the only traces of which are the club-shaped appendages of the lower side of the young Echinaster.

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* See Memoirs Am. Acad. Vol. IX. 1864.

The natural attitude of the Tornaria is with the anal extremity below, as represented in the accompanying figures.

Explanation of Lettering. Plate II.

a anus.
o œsophagus. *m* mouth.
m′ muscle attached to the oral extremity of the conical water-system.
d stomach. *c* intestine.
w oral portion of water-system.
w′ w″ isolated anal parts of water-system.
b water-pore.
e rudimentary anal arm.
e′ epaulettes of oral chord.
e″ epaulettes of anal chord.
f terminal oral arm.
g horseshoe-shaped groove.
v anal part of vibratile chord.
v′ oral portion of vibratile chord.
v″ circular anal vibratile chord.

XXX.—*Examination of American Blendes for* THALLIUM *and* INDIUM.

BY CHARLES A. JOY,
Professor of Chemistry in Columbia College, New York.

Read February 26, 1866.

SINCE the discovery of Thallium by Crookes, in the deposits of the sulphuric acid chambers and the pyritous ores of Europe, and of Indium by Reich and Richter in the zink blende of Saxony, the presence of these rare metals in the ores and minerals of other countries has become a matter of general interest. With a view of adding to our knowledge of the subject I have examined a number of specimens of ores and deposits from American localities, and although the results have generally proved of a negative character, it may be of sufficient interest to have them communicated to the Society.

Through the kindness of Professor Richter, who presented to me some metallic Indium and some of the sulphide, I was able to determine the position of the Indium lines upon the scale of my spectroscope. The Thallium line was determined from a specimen of the sulphate furnished to me by Dr. Hugo Müller of London.

The spectroscope employed was made by Duboscq, and consisted of one flint glass prism having an angle of 50°, and a viewing telescope of ten inches focal length.

In the resolution of the minerals and the preparation of the material, I pursued the methods suggested by Reich, Richter, Winckler, Schrötter, Crookes, and Böttger.

1. *Blende.* Ellenville, New York.

The mineral containing a small quantity of galena and copper pyrites was finely pulverized and washed. It was then digested for twenty-four hours in hydrochloric acid and filtered. An excess of granulated zink was added to the cold solution, and after the evolution of hydrogen had ceased it was boiled until no more gas was given off. The somewhat bulky precipitate was collected on a filter and well washed. It was then dissolved in nitric acid, and sulphuretted hydrogen gas passed through the solution. A brown precipitate formed, which after being well washed was examined before the spectroscope. The filtrate was boiled to expel all of the sulphuretted hydrogen, neutralized with carbonate of soda, and carbonate of baryta then added in the cold. The precipitate formed was dissolved in sulphuric acid and the sulphate of baryta removed. Acetic acid was added and sulphuretted hydrogen gas passed through a second time.

An examination with the spectroscope revealed the presence of copper, manganese, and lime, but no trace of thallium or of indium.

2. *Franklinite.* New Jersey.

This mineral contained magnetic iron, red oxide of zink, and silica. The powder was digested in hydrochloric acid, and the

5. *Zink blende.* Eaton, New Hampshire.

This blende contained considerable lead with manganese and lime, but no thallium or indium.

6. *Zink blende.* Phenixville, Pennsylvania.

Here also manganese was found, but no thallium or indium.

7. *Zink blende.* Stirling, New Jersey.

This blende yielded lime and manganese. No thallium or indium.

8. *Zink blende.* Galena, Illinois.

Remarkably free from foreign substances, with no trace of thallium or indium.

9. *Zink blende.* Colorado.

Contained copper and manganese. No thallium or indium.

10. *Zink blende.* Rockland County, New York.

Yielded no trace of thallium or indium.

11. *Zink blende.* Island of Cuba.

Showed copper, but no thallium or indium.

12. *Zink blende.* Ancram, New York.

Contains manganese and copper; no thallium or indium.

13. *Deweylite.* Pennsylvania.

This mineral, according to some analyses, contains zink, and it was thought worthy of an examination. This specimen yielded neither zink nor thallium or indium.

14. *Greenockite.* Shawneetown, Illinois.

Aside from cadmium and zink this mineral yielded no lines.

15. *Granulated Zink.* Bethlehem, Pennsylvania.

This is a remarkably pure zink made chiefly from calamine. It contains no thallium or indium.

16. *Metallic Zink.* La Salle, Illinois.

This zink is made from the blendes of Northern Illinois and Wisconsin. It showed the presence of manganese but no thallium or indium.

17. *Soot.*

The accumulation of soot from the flues where anthracite coal from Pennsylvania had been employed as fuel was found to contain lithia, potassa, lime, iron, and sulphur, but no thallium or indium.

XXXI.—*On the Geology of the Key of Sombrero, W. I.*

Plates IV. and V.

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Read March 12, 1866.

Sombrero is the most northern Key of the Lesser Antilles, lying at the angle made by this chain with that of the larger West India islands running from east to west. Unlike every other coral-island of modern formation it is intersected by a series of fissures or joints of five distinct systems, the first two running downwards from the surfaces of two of the beds, and the last three commencing in the present denuded surface of the Key. All have been filled with loose deposits subsequently formed upon the surface—the last three by varieties of rock-guano whose characteristics are considerably different. From the great bulk of these latter deposits it is evident that the surface of the island has repeatedly remained above the sea-level during a very great period for the formation of each. It is plain, too, that the area of the island was at first vastly greater than now, and most likely identified with that of the submarine bank of which the Key is now the summit, the area decreasing steadily during the whole history, until worn down to its present small dimensions. These estimates, as to time and area, are corroborated by the discovery of the fossil remains of land-turtles which have been referred by Prof. Jeffries Wyman to three new extinct and gigantic species similar to those of the Galipagos Islands. The Key was uninhabited until the year 1856, since which time it has been occupied by parties engaged in quarrying the guano-deposits, observations on which will be the subject of another paper.

§ 1. *Situation.*—According to the most reliable observations the position of its centre is in Lat. 18° 36′ N. and Long. 63° 27′ 45″ W. It divides the channel between the Virgin and St. Martin banks (which are submerged to a depth of about a dozen fathoms) into two passages: the one on the east of the Key called the Sombrero, and the other (of nearly twice the size) called the Anegada passage. The Virgin bank on the west encircles St. Thomas, St. John's, Anegada, and the other islets of the Virgin group. Its nearest point is forty miles from Sombrero, and the deep-water soundings off its edge vary from 140 to 160 fathoms. The opposite bank comprises the islands of St. Martin, St. Bartholomew, and Anguilla; it approaches within twenty miles of the Key; and the soundings off its edge vary from 102 to 190 fathoms. The only land ever visible from the Key is that of St. Martin and the peak of Saba, low down on the south-eastern horizon. From its situation, then, this formation, isolated by the deep passage on either side, appears in its origin and development to have been independent of these two banks, and to have been wholly indebted to forces at work within its own limits.

The Key itself is also surrounded by a submarine bank, the dimensions of which are about three and a half by five miles. The water is bold along the very face of the cliff, as the soundings vary from eight fathoms on the leeward sides to fourteen along the eastern side. Thence it deepens very gradually to from and generally overhanging a ledge at the level of the sea, continually washed by its rise and fall. The face of the cliff, together with the greater part of the surface of the Key, is weathered to a dark, slaty-blue color; the former being girdled (in the southern and higher level) by two distinct lines of stratification, as if where least denuded there were three beds. The vertical veins of guano, generally colored reddish-brown, sometimes intersect the face of the cliff; but it is only by landing upon the Key that they can be plainly distinguished, together with the signs of denudation,—the fractured edges of the beds, and general ruggedness of the surface, which pertain to its character as an elevated reef.

§. 3.—*Ground-swells* coming from N.N.W. to W.N.W. are frequent during the winter season, especially from November to March inclusive, and are often very heavy.

There are two facts which prove that the agitation of the water reaches to the bottom in such swells.

First, That fish-pots, which are sunk on the bottom on the leeward side of the Key, in thirteen fathoms water, have been repeatedly carried away and lost on the sudden occurrence of a swell. *Secondly*, That the lighters, which have been occasionally swamped at their moorings by violent swells, are always broken up and cannot be recovered. Another proof of the friction upon the bottom may be the greenish tint which the sea assumes during a ground-swell over the Sombrero bank, by which it is said that the outline of the bank is quite perceptible to an observer on a passing vessel, though not from the Key.

§ 4. *Earthquakes.*—During the last five years several slight shocks, rarely exceeding a tremor, have been felt on the Key and in its vicinity. As usual in this region their local character has been conspicuous, some having been confined to two islands or only to one, even in the same bank. This peculiarity, and the series of oscillations which seem to have affected the Sombrero bank alone, may be illustrated by the following table of the shocks which have been observed on the Key and at St.

Martin, about forty miles distant, the latter having been noted by a resident in the town of Philipsburg.

Date.		St. Martin.	Sombrero.
1861	July 12	1.30 A.M. No sound.	Subterranean sound.
1862	Feb. 9	1.45 A.M. " A smart shock."	2 A.M. Sharp shock.
	Mar. 26	4.45 A.M. " A smart shock."	No shock felt.
	June 20	Night. No shock felt.	Sharp shock.
	" 21	1.10 P.M. " A smart shock."	1 P.M. Strong tremor.
1863	Jan. 7	2 A.M. " A slight shock, accompanied with a loud and long roaring noise."	No shock felt.
	Oct. 14	10 A.M. " A smart shock."	No shock felt.
	" 21	5 P.M. " A slight shock."	" " "
	Dec. 10	11.30 A.M. " A slight shock, accompanied with a loud and long roaring noise."	" " "
1864	May 10	8 A.M. and 11.30 A.M. Two slight shocks.	" " "

Similar observations have been recorded by Schomburgk, concerning two islands of the Virgin group, which are only 20 miles apart.

Date.		Tortola.	Anegada.
1830	Oct.	Heavy shock.	No shock felt.

dation may be understood, is given in Fig. 1, the beds being lettered *upwards* from A to F for distinction. As only a remnant of small area exists of the highest bed, there is only one of the quarries which gives a section of the whole. From the sketch of this section (Fig. 2) an idea may be obtained of its general appearance and constitution. In this and all sections of the southern level, as in the face of the surrounding cliff, only two horizontal divisions are prominent; but the effect of the upper is heightened, upon the fresh surface of the sections, by the contrast between the greyish band of D and the white limestones above and below.

Here, as usual in a geological problem, only a part of the facts are furnished; of the six leaves in the centre of the book the very margins have been torn away. Doubtless the older and larger portion of the formation is submerged below the sea-level. The submarine face of the cliff, about eighty feet in depth, must certainly consist of limestone, and it is probable that the basis of the whole calcareous stratum will not be reached before a depth of one or two hundred fathoms or more, as off the edge of the bank. On the other hand, several of the most recent beds may have been removed by denudation from the summit of the Key.

Concerning the former extent of all these beds we have no data, but a clue exists in the area of the submarine bank.

§ 6. *Oscillations.*—The marine deposits appear to have formed upon the area, oscillating vertically, of the bottom of a lagoon, more or less inclosed; and even in the earlier deposits of extraneous origin, succeeding the emergence of the area from the sea, we may detect traces of the influence of the basin-form peculiar to the surface of an elevated atoll. These oscillations generally seem to have consisted of a prolonged subsidence, during which each bed was formed, and of a sudden elevation to a greater or less height, marked when it was greatest by the sharp upper limit of the bed. It has thus happened that the organic components of the bed are in some degree peculiarly disposed, *vertically*, according to the submarine depth reached and the vertical range of species, as well as to the nature of the barrier reef. In relation to these movements, the position of the Key on the prolongation of the volcanic axis marked by the leeward islands of the Lesser Antilles (one of which, Saba, is in sight to the S. by E.), and the coincidence with this axis of the trend of the last three systems of joints, are facts worthy of note. In all the oscillations no irregular movements ever occurred to cause the plane of the rim of the basin to deviate from its coincidence with that of the horizon.

The atoll-character of this Key seems to be an anomaly in the West Indies, but these islands have hitherto been very imperfectly explored, and it may be fairly suspected that many of the isolated keys and banks with which its archipelagoes abound, may reveal to future examination the possession, (in their former history if not at present,) of a true atoll construction.

§ 7. *Varieties of Limestone.*—The limestone, of which the Key is mainly composed, is similar to that of modern coral islands. It comprises five varieties, which may be designated as follows, for the sake of convenient reference: Madrepore

Bulla limestone is a congeries of small shells, chiefly *Bulla*, with sometimes a few corals interspersed. Color white. Structure compact. Fracture uneven. Specific gravity=2.20—2.28.

Sand limestone mainly consists of a compact limestone, intermixed with a few individuals of *Bulla*, etc. Corals rarely or never occur. Color white, but generally not so pure as in the former varieties. Fracture uneven to even. Specific gravity=2.36—2.55.

Lagoon limestone consists of a greyish (sometimes pinkish), hard, fine-grained, tough limestone, susceptible of polish. Fracture even to sub-conchoidal, and smooth. Detached fragments or protuberances of all the limestones clink musically beneath the hammer; but this sonorous property, extreme compactness, and excellent preservation of the fossils, especially characterize this variety. The fossils are rare, (a few shells, chiefly *Bulla*, but no corals,) and often wanting. Fracture even to sub-conchoidal, and smooth. Specific gravity=2.55—2.71.

The limestones increase in compactness from the first to the fifth. The only trace of crystalline character is the Calc Spar, which occasionally fills the cavities of the fossils. An oolitic structure has never been observed.

The upper surface of certain beds consists of a thin layer or scale of limestone differing from the preceding. Its color is usually light to dark brown. Fracture even. Specific gravity =2.67. It is always very fine-grained and compact, sometimes massive, but often displays on its vertical section, a series of fine horizontal lines of lamination. It is evidently a deposit of an impure carbonate of lime from at least partial solution in water; and as it occurs in layers intervening between the beds, thus marking their stratification, its section (which is always quite distinct in contrast with the white limestones) may be styled the bedding-line. It always adheres to the bed on which it lies, and is partially incorporated with it.

A few series of specific gravity determinations have been made upon specimens of the limestone of each bed, selected on the same vertical lines at different heights on the sides of quarries. In all these determinations the specimens were coarsely pulverized, and distilled water at 80° F. employed.

	I.	II.	III.	IV.
E	2.47	2.37		
	2.09	2.23		
D	2.71	2.55	2.64	2.62
		2.51		2.61
C		2.55		2.49
		2.28	2.52	2.43
B		2.36		
		2.20		
A		2.39		
		2.49		
		2.57		
		2.56		

The upward increase of the density of the *material* of each bed is thus displayed, except in bed A, in which Calc Spar occurs in the fossils.

§ 8. *Modes of Fossilization.*—In these beds there are five modes by which the fossil organism is represented.

First, The original shell (or its thickest portion) remains, *Fourthly*, The inner and outer casts alone remain, the cavity being empty. This is the most common of all the modes, with both shells and corals.

Fifthly, The cavity between the casts has been partially or entirely filled by infiltrating solutions, sometimes with Calc Spar and sometimes with Phosphate of Lime. A collection has been made of most of the fossil species of this formation, all of which are supposed to be recent. Its material is probably similar to, if not identical with, whatever deposits may be now forming in the West India seas.

The characters and histories of the beds may now be successively considered.

BED A.

§ 9. *Character.—Bed A* underlies the whole Key and varies in thickness (from the sea-level to the upper limit) from *seven* to *twenty-four* feet, averaging about *ten* feet in the southern part and *seventeen* in the central and northern parts. It not only thickens gradually thus towards the north, but rather suddenly at various points from west to east. This irregularity is due to the varying thickness of the lowest of the three bands of which it is composed, whose respective thicknesses are as follows:

BANDS.	Southern Level.		Northern Level.	
	RANGE.	AVERAGE.	RANGE.	AVERAGE.
Sand Limestone.......	½—1 ft.	7 in.	2—10 in.	6 in.
Bulla Limestone......	¼—6 ft.	3½ ft.	1—10 ft.	4 ft.
Madrepore Limestone..	4—9 ft.	5½ ft.	5—15½ ft.	12½ ft.

The casts of the coral branches in the lowest band, especially near the bottom and sometimes throughout, have been filled with sand or with Calc Spar, and consequently present a blurred appearance. Its upper portion very often, if not generally, consists, to the depth of about a foot, of another species of coral of more delicate structure. The upper limit of the band is generally well defined, with slight undulations, though occasionally (especially in the northern part of the Key) it swells up until it nearly reaches the top of the bed. Next above comes a layer abounding in shells, which finally graduates into an almost unfossiliferous rock. A bedding-line, about half an inch in thickness, marks the upper limit of this bed with a narrow brown line. The fourth method of fossilization is most common in some sections of the upper two bands, but the fifth (with Calc Spar) generally prevails in the lower two. In the latter case fossils are often found projecting from a water-worn surface, identical with the original shell in form and markings.

§ 10. *Veins.*—The band of Sand Limestone is more or less intersected by fine vertical veins, usually from two to twelve inches in depth; sometimes also a layer of the bed, reaching a few inches below the bedding-line, is completely cut up into small fragments or angular pebbles by a network of fine and short veins running irregularly in every plane. These veins are generally covered by the bedding-line, and filled with its material, but never with that of the next bed, B. Towards the coral-bed, from their fragility and that of the corals, and from the absence of fragments, it may be inferred that the reef grew in comparatively quiet water. As the heavy ground-swells have considerable force even to the limiting depth of coral-life, sufficient to have frequently stirred up the sand and killed and broken fragile organisms, the quietness of the locality could not have been due simply to great depth. We are forced to believe then at the outset, that some barrier encircled the reef, probably of much greater age,—a constant accompaniment of the lower beds, varying at different periods in height relative to the bottom of the lagoon. Indeed such a barrier must necessarily have been formed on the outer edge of the oscillating area, on the first occasion that the superincumbent sea was sufficiently shallow to support coral life, creating an atoll when it reached the sea level. This elevation of its summit was at least sufficiently great to break the force of the ground-swells and storm-waves, but may have occurred only along its outline from E.S.E. around by North to W.N.W., whence alone comes the violence which at the same time battered the sea-face and threw up débris. However, the universal distribution of the reef shows a considerable communication between the sea and the lagoon waters, either over the barrier or through its intersecting passages.

The thickening of the reef towards the N. and E. seems to denote the proximity of the barrier-reef at those points, since the coral formation must have flourished in a higher degree and for a longer time in the shallower waters near the shore of the lagoon and the passages of the barrier.

From the general level of the surface of the reef it may be inferred that the communication of the lagoon-waters with the sea subsequently decreased greatly, either on account of the rising of the barrier above the sea-level, the partial closing of its passages, or perhaps the increasing depth, and that coral-life ceased over the central area, with the exception of many scattered clumps and the frequent super-position of a more delicate species.

These remnants were next overlaid with coarse sand from the shore of the lagoon and the barrier-inlets, and thereby killed. The greater quietness and depth of the water favored the abundant growth of a few species of fragile shells, whose unbroken condition proves that they grew where they now lie.

This abundance then suddenly ceased and sand predominated more and more in the deposits, most likely on account of the increasing depth. The increasing compactness of the rock towards the surface of the bed may be attributed to the gradual closing of the barrier-inlets, the decreasing quantity of coarse sand introduced through them, the less agitation of the waters of the lagoon from without, and the finer comminution of the mud formed upon its shores.

This subsidence was terminated by a sudden elevation of the central area again into shallow water, accompanied with a tension which perhaps produced the vertical fissures in the top of the bed. The superficial networks of short fissures may, however, be due to contraction, if the surface was slightly elevated above the sea-level and exposed to the sun and atmospheric agents.

to be represented by a few isolated patches of Madrepore or solitary spheres (in one case three feet in horizontal diameter), of *Mæandrina*, Bulla limestone taking its place. Within from six inches to three feet of the upper limit the material is either Sand or Bulla Limestone. The following series will thus represent the composition of this bed.

1—Sand limestone,
2—Sand and Bulla limestones intermixed,
3—Bulla limestone,
4—Ditto, slightly intermixed with Coral, and
5—Coral limestone:

of which Nos. 4 and 5 are wanting in the centre of its present remnant, but are successively introduced towards the N., E., and S., and of which Nos. 1, 2, 3, and 4, seem to decrease successively in the same directions. In parts of the northern level, and there alone, the upper portion of this bed, about two feet in thickness, is separated from the main body by a horizontal seam. The upper limit of the bed is marked by a bedding-line, three-eighths of an inch in depth, only in this level; while in the southern level it is possible to distinguish this limit, on a section, only where the lower part of the next bed above abounds in fossils which contrast with its own unfossiliferous Sand limestone, or *vice-versâ*. The fourth method of fossilization prevails, but there are rare instances of the second.

§ 13. *History.*—After the elevation last mentioned a new period of subsidence began, the sea-water permeated the barrier (probably through fissures), a shallow but deepening lagoon was produced within, and, perhaps on account of the gentle attrition of the ripples of the quiet waters, a calcareous mud was deposited as an impalpable sediment, filled the fissures and overspread the whole bottom, *i. e.* the upper surface of Bed A. This must have been forming during a considerable period and at the same time consolidated, since there is little adhesion between the material of this "bedding-line" and that of B.

Subsequently the green clay was formed, which will be particularly described under D. Its fine comminution denotes either its formation by the lagoon-wavelets or the distance of the present area from its source. Its chemical composition, unprecedented in connexion with a coral formation, signifies its derivation from some foreign rock, not calcareous, such as occurs in neighboring islands. Its general superposition above the bedding-line and little intermixture with its material in the veins denote the greater hardness of its source.

It is plain besides, from the identity of their material with that of the upper layer, from their angular shape, and from the entire absence of any coarse sand, shells, or beach-refuse intermixed, that the pebbles scattered over A were not thrown over the barrier reef. All the evidence, therefore, tends to show that a peak of more ancient material, perhaps volcanic, existed within or in some connexion with the atoll; that quantities of its fine débris were formed; that, at a certain period of the subsidence, the ground-swells forced their way in through passages on the leeward side of the barrier (perhaps perforated by the widening of the fissures), tore up portions of the crust upon the bottom and of the surface of the bed beneath (wherever it was

BED C.

§ 14. *Character.*—This has been entirely removed, like the succeeding beds, north of the slope between the two levels. The variation of its thickness in the southern level is from *three* to *six* feet, and its average *five* feet; but it increases rapidly to *ten* feet towards the south. This is the only increase in the present remnant. The bed consists of Sand limestone, of Bulla limestone, or of two bands, the lower being one or two feet in thickness and composed of Bulla limestone or a mixture of the two. The presence of Madrepore limestone also in some sections near the northern and southern extremities of the remnant suggests the former predominance of coral towards those points (in the portions now carried away), as in B.

Its upper limit is as difficult to distinguish as its lower, particularly when the materials of the tangent surfaces of C and D are identical so that the two beds coalesce. In many sections a great many seams, running horizontally, or with a slight obliquity, divide the rock, within a foot of this probable junction, into layers or discs a few inches in thickness. The fourth mode of fossilization prevails.

§ 15. *History.*—It is probable that the bedding-line material, which caps the northern part of B, does not signify a closed lagoon and the reproduction of calcareous mud, but that an empty seam intervened between the two beds, which has been filled with the lagoon mud from the top of D through the fissures of the second system.

Deposits of shells and of sand of increasing fineness were successively formed, in this as in the former period, and probably with coral-reefs in the shallower waters near the shores.

From the absence of a system of fissures betokening violence and tension, and from the marked scarcity of coral-reefs in the beginning of the next period, it may be inferred that the elevation by which this subsidence was closed was of comparatively small range, even less than that of the last, since it was not sufficient to change the character of the succeeding deposits, but only to establish a separation over small areas.

The irregular lines of oblique lamination in the upper part of the bed may show that the deposition of sediment was temporarily interrupted over certain small surfaces, *e. g.*, by the frequent occurrence of shocks and slight upheavals, or by the accidentally unequal distribution of the detritus; on which account the subjacent material hardened so as not to unite with the detritus subsequently overlaid.

Bed D.

§ 16. *Character.*—Wherever the limits of this bed exist its thickness varies from *one* to *six* feet, with an average of *four* feet; the variations are irregular, as if caused merely by the hollows in the upper surface of the underlying bed.

The upper two feet of this bed, as a general rule, partake of the character of Lagoon limestone, and its lower portion of Sand limestone, the difference of the two consisting chiefly in the upward-increasing fineness of the grain of the rock and in the exhibits a great number of pebbles and blocks, all more or less angular and tabular, up to *one foot* in diameter, always consisting of Sand or Lagoon limestone, and often having portions of the bedding-line attached. Two rarer varieties of these pebbles are worthy of mention. The first possess a compactness excelling that of any of the rock *in situ*. They have a conchoidal fracture, are translucent on their edges, and have a specific gravity=2.56—2.69. The second are peculiar for their color, which varies from greyish-white to deep brownish-black, through shades of brown. When these transitions occur in a single pebble it sometimes resembles a half burned piece of Anthracite. In one pebble faint traces of lamination were detected. The color is due to a number of black points scattered through the material (Lagoon limestone), which remain in an insoluble carbonaceous sediment, on the solution of a pebble in Hydrochloric acid, while Sulphuretted Hydrogen is strongly perceptible in the gases evolved. Their fracture is even to subconchoidal, they are sometimes translucent on their edges, and their specific gravity ranges up to 2.73. These varieties of course show the greater fineness of the deposits, in some portions of the area, and the intermixture of organic matter.

§ 17. *Veins* (of the Second System). The superficial portion of the Lagoon limestone is very commonly intersected by reticulations of fine veins (Fig. 2) as in Bed A. Other fine veins, from one-eighth to half an inch in width, mostly vertical, run down to all distances from the bedding-line, commonly stop at or before the bedding-line of A, and sometimes reach the sea-level where observation is cut off. They gradually thin out as they approach their terminations, and are very abundant in some sections. Some of these veins, however, of various lengths, range in width from several inches to two feet, while others possess the form of vast basins or receptacles in the surface of the bed. The depth of the latter varies from two or three feet down to an unknown distance beneath the sea-level. Their areas in the southern level, wherever they could be measured, vary from eight to sixty square yards, and in the northern level, where they especially abound, from three to fifty. Their sides are usually either vertical or slope at various angles downwards and inwards, but sometimes they burrow a few feet underneath the Lagoon limestone. They may therefore in general be described as funnel-, wedge-, trough-, pan-, or basin-shaped cavities sunk in the surface of this bed, of which those of the northern level have of course been decapitated by denudation.

The finer veins are mostly filled with the bedding-line material, but the larger with what has already been styled the Green Conglomerate. The smaller pebbles of this rock are more usually rounded than the larger, but they have already been described. The cementing material is of three kinds. The first is the ordinary bedding-line material. The second is a soft light green marl of so fine a grain that when rubbed between hard surfaces no siliceous grittiness is observed, but only brittle and easily crushed particles of Carbonate of Lime. Often on weathered surfaces either it is mottled with rusty-red spots, or its color is more or less changed to a light-brown. The third kind is more common than either of these

Magnesia	2.46	1.92
Alumina	1.89	3.75
Protoxide of Iron	3.08	2.66
Alkaline chlorides	2.36	1.81
	98.99	99.13

The greenish color is due to the Protoxide of Iron, as the insoluble silicate is a light brown impalpable powder. It yields up its bases to boiling sulphuric acid, and is also partly decomposed by mere ignition.

The long and finer veins are generally occupied by the first kind of cement; the shorter, either by the first or second. The latter often do not have vertical straight sides, but have evidently been widened before the reception of the marl, which fills many rounded expansions in their sides. Many of the longer veins, which are sufficiently wide at their origin and become narrower as they descend, are occupied by conglomerate above and cement below. Sometimes where a vein intersects the bedding-line of B or A, the conglomerate has been interlaminated for some distance around between the beds. The broader veins are occupied by nodules from the size of gravel up to six or nine inches in diameter, with their longer dimensions arranged vertically, as they have fallen or worked their way down the fissures. In the basins the cement predominates, consisting usually of the third kind. In many basins the sides of the slope and the bottom are covered with the largest blocks; above these the pebbles of the conglomerate decrease in size upwards; and the highest portion of the cavity is filled merely with the cement, arranged in horizontal laminæ. Sometimes the whole basin is not completely filled up. Traces of the green marl may sometimes be seen among and beneath the pebbles on the surface of the bed, or intermingled with the material of the subjacent bedding-line. The fossils of the pebbles are identical with those of beds C and D. In the cement, however, a very few individuals of *Trochus* and *Cerithium* (but no corals) have been observed.

In some narrow veins brownish masses of Calc-spar have been formed among and around the pebbles.

§ 18. *History.*—The remarkable fineness of the last deposits of this bed suggests that during this period the bottom was depressed to the greatest depth yet reached, and that the communication with the sea was less than ever before. The absence of any fragments intermediate in size between the perfect shells and the minute pieces, as well as the occasional preservation of the lustre and markings of the latter, suggest that these have not been formed by attrition, but perhaps by those fish and crustaceans which feed upon molluscs. As the degree of concentration of the lagoon waters, in this and former periods, may have experienced considerable variation, we may deduce from the general abundance of *Bulla* a peculiar hardihood in that species of supporting such a variation without extinction. Again, as the formation of the Lagoon limestone must have been very slow, the depth (about half an inch) occupied by an individual *Bulla* must represent a far longer period than that of its life.

In several localities soft masses of calcareous mud, a few panying an uplift of so great a range are denoted by the multitude and length of the fissures, though, as in A, the superficial network has doubtless been produced by contraction on atmospheric exposure.

BED E.

§ 19. *Character.*—The upper limit of this bed has escaped denudation in only one locality, viz. beneath and in the vicinity of the remnant of bed F (Fig. 1). Its thickness is there from 5½ to 9 feet, but elsewhere it varies from a few inches to 13½ feet, averaging 10 feet. It seems to thicken considerably towards the west or northwest, and must probably have had a thickness of 20 or more feet on the west cliff before denudation. The bed wholly consists of Porites limestone, perhaps most frequently capped with a few inches of Sand limestone. In the lower portion of the bed the color is snow-white and the structure loose and crumbling, while the higher is more compact, hard, and crystalline, with a bluish tinge.

The shells belong to many species, and the spines of *Strombus* are often rounded or water-worn. A study of this bed might throw light upon the molluscs of the present West Indian coral banks, as the solitary dispersion of the *Strombus*, the contrary gregarious habits of the *Bullidæ*, the frequent insertion of the *Solenidæ* in masses of *Astræa*, etc., are visible at a glance. A tiny cylinder, connecting the casts of *Tellina*, frequently indicates the hole perforated by some borer through the original shell. Occasionally the thickest portions of the shell of *Strombus* are perfectly preserved, but generally with its superficies converted into a soft snow-white mass. One specimen of *Echinus* has been found.

The corals predominate in quantity over the shells. The reefs of Madrepore are the bulkiest, but the spheres of the massive corals sometimes reach 3 to 3½ feet in horizontal diameter. Usually, however, though numerous, they are of small size, 3 inches to 1 foot. Occasionally they are somewhat angular and fragmentary. Some corals are replaced with Calc-Spar.

This bed is the richest of all in species. The fourth mode of fossilization prevails, but the material of the most common coral, *Porites astracoides* (?), has everywhere been converted into a soft and friable white carbonate of lime.

§ 20. *History.*—The erosion to which the fissures, produced by the last elevation, were subjected during the first part of this period, was probably chiefly due to the prolonged action of running streams, derived from the rains or spray, trickling through those fissures which connected with the sea. It is further probable that by the plunging-force of the ocean waves, overleaping the barrier in storms and ground-swells, portions of the hard upper crust of Lagoon limestone were torn up, the softer rock underneath exposed, and an opportunity thus afforded for the excavation of basins of a variety of shapes. As the subsidence progressed, these incursions of the sea made havoc more frequently over the central area, tearing up the rock wherever most weakened by fissures. Their transient occurrence is shown by the general angularity of the nodules, In the progress of the subsidence, the central basin became again submerged by the infiltration of sea-water, and deposits of impure calcareous mud and of green clay were again successively formed and mingled with the pebbles. The per-oxidation of the iron in many masses of conglomerate has probably been produced at later periods, by the percolation of aerated waters through intersecting fissures. In these turbid and impure waters of course no corals, but only a few marine shells, could grow. As the lagoon deepened, the incursions of the sea had a continually diminishing influence upon the bottom; the nodules formed and swept into the veins decreased in size and lost their angular shapes; and finally only the debris, ever forming, of the foreign rock was introduced into the conglomerate deposits.

It happened occasionally in the latter part of the subsidence, in some narrow and deep gulley of the bottom, whose limits inclosed a pool of quiet water rarely disturbed by the agitation of the surface, that the materials in suspension were deposited film after film, so that the upper portion of the sediment assumed a laminated instead of the amorphous character of the earlier and coarser portions below. The very great excess of the detritus in this period, over that at the beginning of B, may be attributed to the longer resistance to external erosion and perforation of the higher and bulkier barrier formed during the last subsidence.

The barrier was at last broken through, the fresh ocean waters again filled the lagoon, and new coral deposits were formed. The characteristics of the bed show that freer communication with the sea now existed than on any previous occasion, probably because the number and depth of the fissures had led to the production of more numerous and broader inlets. The comparatively dwarfed individual development of the corals, notwithstanding the abundance of nuclei, was not so favorable for their growth as that afforded without the barrier. The principal reasons may be the absence of surf to supply waters continually aerated and to keep the corals washed clean from fine sand, the shifting nature of the sandy bottom, occasionally stirred up by the ground-swells, the occasional slight freshening of the lagoon by rains, etc. The presence of Calc-Spar in this bed, as well as in A, also suggests the more frequent entrance in these two periods of the ocean-waters, which must have had a greater content of carbonic acid and solvent power than the waters of a closed lagoon. During the whole of this subsidence the water remained shallow and thus especially favorable to an abundance of shells and corals. The elevation which next occurred, the fifth in the series, therefore reached a small height, as it was confined below the sea-level.

Bed F.

§ 21. *Character and History.*—Only a remnant of the lower portion of this bed remains, resting in place upon E and varying from *one* to *three* feet in thickness. This seems to consist chiefly of reefs of Madrepore, like the lower portion of E or of A.

movement, so slow as to allow coral-growth (if not otherwise checked) to compete with it and succeed in keeping the surface of a reef at or near the sea-level. If it were ever faster than coral-growth, the barrier would have been carried down and submerged, the fresh ocean-waters introduced, and the central area perhaps overlaid with another coral-growth of deep-sea species, of which there is no evidence.

Two conditions seem to have peculiarly affected the character of the deposits,—the amount of communication between the sea and the lagoon, and the depth and the vertical range of marine species. Both have evidently co-existed, and their effects are similar, so that the latter may have been wrongly attributed, in the foregoing remarks, to one or the other of these causes. Another source of error is our ignorance of the shape of the lagoon and of the position in it of the present remnant of its deposits. The former may be reasonably identified with the outline of the submarine bank, and it may be concluded that the present remnant lay near the centre of the lagoon, from its position near the centre of the bank, from the basin-form of the upper surface of bed A, and from the apparent possession of a coral-rim by each bed. For the beds must in all cases have sloped upwards and thickened outwards towards the shelving shores of the lagoon, along which, whatever the depth in the centre, a coral ring may always have existed when the inlets were open. The present indication may, however, be delusive, if any peak or other occasion for a shoal existed within the lagoon.

A low knob of foreign rock apparently did occur, and was the nucleus of the whole formation. It must have disappeared in the denudation of the atoll in the course of the first or second guano-period, as will be shown hereafter. It was probably a part of a mountain peak whose base was buried in the lower beds, and whose summit alone affected the beds within our view. The occurrence of the green clay only on the surfaces of two beds (the formation of each of which appears to have ended by an uplift of the bottom from a considerable depth to above or near the sea-level), suggests that the peak was thus brought within the reach of surface action, or that a passage was thus in some way opened for the introduction of its finest detritus in suspension. The obstruction of this passage, or the investment of the peak with a fringing reef, may have prevented the formation of the clay in other shallow-water periods and its intermixture with the overlying limestone. The distribution of the detritus would also depend upon the relative position of the present surface and the peak, with reference to the prevailing winds, the character of the inlets, the entrance of the ground-swells, and the shape of the lagoon.

We have now arrived at a period at which there is a blank in the record, closing the submarine movements. We have little clue by which to determine the original thickness of bed F, or the number and thickness of the subsequent beds. It is probable that the later beds, if any, were not attended by upheavals of great range and violence, since they produced no system of fissures.

§ 23. *Sub-aerial Movements.*—The following is a summary of mation of stalactitic deposits and of crystals of various phosphates of lime.* Subsidence to sea-level and denudation of surface.

Eighth elevation, to over 160 feet. Formation again shattered.

Ninth subsidence, of about 40 feet. Erosion of joints and cavities. Formation of a third guano-deposit. Lateral erosion of island nearly to its present dimensions. Formation of a sand-bank to the north-west. Change in the ocean-currents by an elevation of the neighboring banks (?).

Sudden fall of about 80 feet, beginning the modern period. Denudation of surface. Probable repeated formation and removal of superficial deposits of guano and sand. Formation of boulders and spray-pools.

The deposits formed above the sea-level thus comprise three layers of guano at successive periods, the greater bulk of each of which has been swept from the surface of the Key, though not until its most valuable portion was disseminated in veins through the subjacent limestone. Of these three, the first is the only one present in considerable quantity; the second is, in part, unfit for agricultural purposes; and the third is the easiest to obtain. Regarding the beds now beneath the sea-level, it is likely that their corresponding oscillations were entirely confined below that limit. But if the bottom of the lagoon sometimes emerged, as it is possible, to a considerable height above the sea, they may now contain ancient guano deposits in interlaminated beds or in veins.

§ 24. *Curve of Oscillations.*—By the simplest (though not necessarily the most correct) interpretation of the phenomena of the six beds, seventeen alternating sudden elevations and slow depressions seem to have occurred before the modern period. Fig. 3 is a graphic representation of these, for the average section of the southern end of the Key. Little accuracy can be expected and is claimed for the abscissæ and ordinates of the points of the curve, on account of the little knowledge we possess, concerning either the absolute or relative annual increase of deposits of corals, shells, and sand, and concerning the vertical range of species, in a lagoon whose communication with the sea varied so widely.

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* Am. Jour. Sci., Nov. 1865.

For our approximate purposes we will assume that the rate of deposition was the same in all materials except the coral, and lay off the abscissæ (the measures of time) in direct proportion to the thickness of each bed, with a deduction of four-fifths* from that of every coral band.

As to the conjugate axis we have a few observations to guide us, but a determination of the vertical distribution of the fossils in each bed might have produced more definite results. The deposits seem to have varied according to the subsidence of the bottom through portions of one or more marine zones, more or less influenced by the character of the barrier, on account of which the organisms and deposits of a lower zone may sometimes have begun at a higher level through the greater tranquillity of the lagoon. The only one of the division lines which can be defined is the well known lower limit (about 100 feet) of the Coralline zone. The more open or closed condition

XXXII.—*Catalogue of* BIRDS *observed on* NEW YORK, LONG *and* STATEN ISLANDS, *and the adjacent parts of* NEW JERSEY.

BY GEO. N. LAWRENCE.

Read April 16, 1866.

FAMILY VULTURIDÆ.

1. *Cathartes aura* (Linn.). Turkey Buzzard.

This species is the only Vulture that is found so far north as the parallel of New York, where it has been considered rare and an irregular visitor. I heard of an individual having been killed at Flushing, L. I., some years ago; at Rockaway, L. I., on the 4th of July, 1864, I noticed a company of nine sailing overhead in their graceful mode of flight, and by a succession of circles gradually working in a westerly direction. The previous summer I observed a single one circling over a neighboring farm, and a day or two afterwards saw it sitting quietly in the garden on the same farm, it having been winged by one of the family. On inquiry of an old resident, I found their visits were not unusual when attracted by suitable food. He stated that he had seen on that part of Rockaway Beach which lies between Jamaica Bay and the Atlantic, more than a hundred assembled at one time and sitting on the cedars. This portion of the beach is narrow, about five miles in extent, and in most parts covered with a dense growth of cedars. It terminates to the west in a point which is the south shore of the inlet to Jamaica Bay, and is opposite to and only about ten miles distant from the point of Sandy Hook on the coast of New Jersey, in which state this species is abundant.

FAM. FALCONIDÆ.

2. *Falco anatum*, Bon. Duck Hawk.

Not an abundant species, but well known to gunners at the sea-shore, from its boldness. I have a fine specimen which was killed at Rockaway, in the act of carrying off one of our wooden snipe decoys, which it had seized.

3. *Hypotriorchis columbarius* (Linn.). Pigeon Hawk.
4. *Hierofalco Islandicus* (Sabine). Jer Falcon.

This species is of rare occurrence in our vicinity. A beautiful specimen, not quite adult, was most liberally presented to me by our fellow member Mr. John Akhurst, Taxidermist, of Brooklyn; it was killed on Long Island in the winter of 1856.

5. *Tinnunculus sparverius* (Linn.). Sparrow Hawk.
6. *Astur atricapillus* (Wils.). American Goshawk.
7. *Accipiter Cooperii*, Bon. Cooper's Hawk.
8. *Accipiter fuscus* (Gm.). Sharp-shinned Hawk.
9. *Buteo borealis* (Gm.). Red-tailed Hawk.
10. " *lineatus* (Gm.). Red-shouldered Hawk.
11. " *Pennsylvanicus* (Wils.). Broad-winged Hawk.
12. *Archibuteo Sancti-johannis* (Gm.). Black Hawk.
13. *Nauclerus furcatus* (Linn.). Swallow-tailed Hawk.
14. *Circus Hudsonicus* (Linn.). Marsh Hawk.
15. *Aquila Canadensis* (Linn.). Amer. Golden Eagle.
16. *Haliaetus leucocephalus* (Linn.). Bald Eagle.

over the Hawk, when suddenly the screaming bird dropped the fish, and as it fell glittering in the early sunshine, the Eagle darted downwards with the speed of light, caught it before it reached the tree tops, and rose gracefully, carrying off the prize.

I saw one on another occasion approaching the spot where I stood on the shore; at first I could not account for its fearlessness, until changing its course it sailed beautifully to the surface of the water and picked up a floating fish which I had not before observed.

17. *Pandion Carolinensis* (Gm.). Fish Hawk.

FAM. STRIGIDÆ.

18. *Strix pratincola*, Bon. Barn Owl. Rare.
19. *Bubo Virginiana* (Gm.). Great Horned Owl.
20. *Scops asio* (Linn.). Mottled Owl.
21. *Otus Wilsonianus*, Less. Am. Long Eared Owl.
22. *Brachyotus Cassinii*, Brewer. Am. Short Eared Owl.

This species is quite common on the meadows of the south side of Long Island. At one time I saw seven in company, sitting not very far apart, probably a family of old and young, but all fully grown. They appear to see quite well by day, as after once starting them (apparently from sleep) they become quite watchful and difficult of approach. I have occasionally seen them in the day-time hawking over the meadows.

23. *Syrnium nebulosum* (Forster). Barred Owl.
24. *Nyctale acadica* (Gm.). Saw-whet Owl.
25. *Nyctea nivea* (Daud.). Snowy Owl.
26. *Surnia ulula* (Linn.). Hawk Owl. Rare.

FAM. TURDIDÆ.

27. *Turdus mustelinus*, Gm. Wood Thrush.
28. " *Pallasi*, Cab. Hermit Thrush.
29. " *fuscescens*, Stephens. Wilson's Thrush.
30. " *Swainsonii*, Cab. Olive-backed Thrush.
31. " *migratorius*, Linn. Amer. Robin.
32. " *nævius*, Bon. Varied Thrush. Rare.

33. *Mimus polyglottus* (Linn.). Mocking Bird.

Several years ago I was told by a gentleman residing at Newtown, L. I., that in the extensive swamp adjoining that village, Mocking Birds came and bred regularly every year. A friend informed me that at Bellport, L. I., a fine male bird frequented near the house which he occupied, and attempts were made to capture it, but without success; he supposed it to have escaped from confinement, but it probably was a wild bird. I once saw one on a tree top in the City Hall Park, from which it would fly after insects and return to its post; this no doubt was an escaped bird.

On the sea beach at Barnegat, N. J., I observed a magnificent male which was resident there and breeding; its presence was much valued by the inmates of the house near which it had taken up its abode. The evening previous to my seeing it, as we were crossing to the beach from the main shore, it being bright moonlight and quite still, the notes of this bird were heard for a great distance on the water, and they were kept up until a late hour of the night.

I was informed by a friend who lives on Staten Island, that a [redacted]

FAM. PARIDÆ.

41. *Parus atricapillus*, Linn. Black-capped Titmouse.
42. " *Carolinensis*, Aud. Carolina Titmouse. Rare.
43. *Lophophanes bicolor* (Linn.). Tufted Titmouse.
44. *Sitta Carolinensis*, Gm. White-bellied Nuthatch.
45. " *Canadensis*, Linn. Red-bellied Nuthatch.

FAM. CERTHIADÆ.

46. *Certhia Americana*, Bon. American Creeper.

FAM. TROGLODYTIDÆ.

47. *Thryothorus Ludovicianus* (Gm.). Gr't Carolina Wren. The occurrence of this species so far north is not frequent. I have noticed but two specimens on N. Y. Island. The first was in July, when it was no doubt breeding; the other, which was in remarkably fine plumage, I obtained in the autumn; my attention was called to it by hearing a song of great power and volume, with the notes of which I was not familiar, and which seemed fairly to rival those of the Mocking Bird (*Mimus polyglottus*).

48. *Troglodytes aedon*, Vieill. House Wren.
49. " *Americanus*, Aud. Wood Wren.
50. " *hyemalis* (Wils.). Winter Wren.
51. *Cistothorus palustris* (Wils.). Long-billed Marsh Wren.
52. " *stellaris* (Licht.). Short-billed Marsh Wren.

FAM. MOTACILLIDÆ.

53. *Anthus Ludovicianus*, Gm. Tit Lark.

FAM. SYLVICOLIDÆ.

54. *Mniotilta varia* (Linn.). Black and White Creeper.
55. *Parula Americana* (Linn.). Blue yellow-backed Warbler.
56. *Geothlypis trichas* (Linn.). Maryland Yellow-throat.
57. " *Philadelphia* (Wils.). Mourning Warbler.
58. *Oporornis agilis* (Wils.). Connecticut Warbler.

59. *Oporornis formosus* (Wils.). Kentucky Warbler.
60. *Helmitherus vermivorus* (Gm.). Worm-eating Warbler.
61. *Helminthophaga pinus* (Linn.). Blue-winged Yellow Warbler.
62. " *chrysoptera* (Linn.). Golden-winged Warbler.
63. " *ruficapilla* (Wils.). Nashville Warbler.
64. " *celata* (Say.). Orange-crowned Warbler.
65. " *peregrina* (Wils.). Tennessee Warbler.
66. *Dendroica corcnata* (Linn.). Yellow Rump.
67. " *Blackburniæ* (Gm.). Blackburnian Warbler.
68. " *Castanea* (Wils.). Bay-breasted Warbler.
69. " *virens* (Gm.). Black-throated Green Warbler.
70. *Dendroica Canadensis* (Linn.). Black-throated Blue Warbler.
71. " *pinus* (Wils.). Pine-creeping Warbler.
72. " *Pennsylvanica* (Linn.). Chestnut-sided

e top of the Palisades, in the vicinity of Fort Lee, where it as breeding.

83. *Myiodioctes pusillus* (Wils.). Green Black-cap Flycatcher.
84. " *Canadensis* (Linn.). Canada Flycatcher.
85. *Setophaga ruticilla* (Linn.). Redstart.

FAM. HIRUNDINIDÆ.

86. *Hirundo horreorum*, Barton. Barn Swallow.
87. " *lunifrons*, Say. Cliff Swallow.
88. " *bicolor*, Vieill. White-bellied Swallow.
89. *Cotyle riparia* (Linn.). Bank Swallow.
90. *Progne purpurea* (Linn.). Purple Martin.

FAM. VIREONIDÆ.

91. *Icteria viridis* (Gm.). Yellow-breasted Chat.
92. *Vireosylvia olivacea* (Linn.). Red-eyed Flycatcher.
93. " *gilva* (Vieill.). Warbling Flycatcher.
94. *Vireo Noveboracensis* (Gm.). White-eyed Vireo.
95. " *solitarius* (Wils.). Solitary Vireo.
96. " *flavifrons*, Vieill. Yellow-throated Vireo.

FAM. LANIIDÆ.

97. *Collyrio borealis* (Bon.). Great Northern Shrike.

FAM. AMPELIDÆ.

98. *Ampelis garrulus*, Linn. Wax Wing.
99. " *cedrorum* (Vieill.). Cedar Bird.

In this species I have noticed some peculiarities in color of e wax-like appendages on the wings; in a specimen, pre- nted by Mr. Chas. Galbraith, they are of a light pink, the umage is as usual except that the ends of the tail-feathers are ry pale; another in Mr. Bell's possession had these append- es yellow. Rarely individuals are found in which each tail- ather is tipped with the red appendages.

FAM. TANAGRIDÆ.

100. *Pyranga rubra* (Linn.). Scarlet Tanager.

101. " *æstiva* (Linn.). Summer Red Bird.

Audubon states that this species has been observed in Massachusetts; I have seen it in the Magnolia Swamps of the New Jersey coast near Atlantic City, but never met with it any further north.

FAM. FRINGILLIDÆ.

102. *Hedymeles Ludovicianus* (Linn.). Rose-breasted Grosbeak.

103. *Cardinalis Virginianus* (Bon.). Red Bird.

I have occasionally met with this species in New Jersey, at the back of Fort Lee, and have also seen it from Staten Island, but only in one instance on New York Island, near the High Bridge, when my attention was attracted to it by the loudness of its song.

104. *Guiraca cœrulea* (Linn.). Blue Grosbeak. Rare.

105. *Euspiza Americana* (Gm.). Black-throated Bunting.

106. *Cyanospiza cyanea* (Linn.). Indigo Bird.

107. *Passerculus Savanna* (Wils.). Savannah Sparrow.

120. *Coturniculus passerinus* (Wils.). Yellow-winged Sparrow.

121. " *Henslowi* (Aud.). Henslow's Bunting.

122. *Passerella iliaca* (Merrem.). Fox-colored Sparrow.

123. *Passer domesticus* (Linn.). The House Sparrow.

This familiar European species has been successfully introduced in New York, and colonies have been established at several distant points, where they could have been seen during the past winter. After the extreme cold of last January (1866), when the thermometer marked ten degrees below zero, I noticed them in their usual quarters, apparently unharmed. In Jersey City, also, they are quite numerous. I first observed them in the spring of 1865. A friend, conversant with our local native birds, informed me that he had seen a species in the shrubbery around the church on the corner of 5th Avenue and 29th street, with which he was not familiar; on going to ascertain what they were, to my surprise I found them to be House Sparrows; they were domiciled in the ivy which grew on the walls of the church, and were quite gentle and fearless, some alighting in the street and dusting themselves quite near to where I stood. I afterwards learned from our associate, Mr. Eugene Schieffelin, that he had been looking after them with much interest; in fact he is entitled to the credit, in a great measure, for this important acquisition to our city. In 1860, and for three years thereafter, he yearly set free five or six pairs, mostly in the neighborhood of Madison Square; seven pairs were let out in the Central Park, by the Commissioners, in 1864.

Mr. Schieffelin told me that in the yard of his father's house, in 26th street near Madison square, quite a number were to be seen at almost any time. This was early in June; I went there with him and had the opportunity of examining them very satisfactorily. Some were in the trees, others on the ground feeding among the poultry; I noticed a company of six young birds (no doubt of the same brood) which kept close together on the ground, mixing freely with the chickens, and when pecked at for being in the way, paying but little heed to the admonition, merely hopping to one side; there was a fountain in the yard, and on the edge of the basin this same party were afterwards enjoying a bath together. One pair of adult birds especially took our attention, both being in perfect plumage. I was surprised to see the male possessed of such pure and bright colors, so different from the dingy smoke-begrimed specimens from Europe, usually seen in collections. Their flight is strong, rapid, and direct; they probably have two or more broods in a season, as at this date (the end of March) some appear to be already mated.*

I never expected to see the realization in this city, and by the species supposed to be alluded to, of "a Sparrow alone upon the house top."

That pest of our shade trees and the horror of pedestrians, the caterpillars or larvæ (of "*Ennomos subsignaria* Hüb."), familiarly known as the "measuring worm," from a single one of which a sensitive lady shrinks in disgust, are said to form part of the diet of this species. In Philadelphia, where these worms abound to a much greater degree than in New York, the introduction of this bird would confer a boon on the inhabitants they

132. *Hesperiphona vespertina* (Cooper). Evening Grosbeak. Rare.
133. *Chrysomitris tristis* (Linn.). Yellow Bird.
134. " *pinus* (Wils.). Pine Finch.

FAM. ALAUDIDÆ.

135. *Eeremophila cornuta* (Wils.). Shore Lark.

FAM. ICTERIDÆ.

136. *Icterus Baltimore* (Linn.). Baltimore Oriole.
137. " *spurius* (Linn.). Orchard Oriole.
138. *Dolichonyx oryzivorus* (Linn.). Boblink.
139. *Molothrus pecoris* (Gm.). Cow Bird.
140. *Agelaius phœniceus* (Linn.). Swamp Blackbird.
141. *Sturnella magna* (Linn.). Meadow Lark.
142. *Scoleocophagus ferrugineus* (Gm.). Rusty Blackbird.
143. *Quiscalus versicolor* (Linn.). Crow Blackbird.

FAM. CORVIDÆ.

144. *Cyanocitla cristata* (Linn.). Blue Jay.
145. *Perisoreus Canadensis* (Linn.). Canada Jay.

I have a specimen of this species, killed by one of my bro-ers on N. Y. Island near Manhattanville; he noticed an semblage of small birds which seemed much excited and aking cries of alarm; on going to ascertain the cause, the Jay ok flight, pursued by the screaming multitude. This was in idsummer, a very unusual season for this species to be seen far south.

146. *Corvus carnivorus*, Bartram. American Raven.

The Raven is rare in this vicinity, although quite common ı the New Jersey coast. I was informed by Mr. Akhurst ıat a fine specimen, one of a pair shot on Long Island, and hich passed through his hands, is now in the museum of the . I. Historical Society.

147. *Corvus Americanus*, Aud. Common Crow.
148. " *ossifragus*, Wilson. Fish Crow.

De Kay, in our State Nat. Hist., says of this species, "They are occasionally seen on the shores of Long Island, but are usually confounded with the Common Crow." I have never seen it north of Squan Beach on the coast of New Jersey.

Fam. TYRANNIDÆ.

149. *Tyrannus Carolinensis* (Linn.). King Bird.

In this city, on Broadway between 26th and 27th streets, there is a large Buttonwood tree (*Platanus occidentalis*), a remnant of the original forest, but now in the heart of the city; it stands in the middle of the sidewalk, and has a circumference at its base of fifteen feet. It rears its head far above the neighboring houses; on one of its upper branches, projecting over the street, Mr. E. Schieffelin pointed out to me last spring a nest of this species, where for several seasons broods of young had been hatched out (probably by the same pair), unmindful of the noise and confusion below.

150. *Myriarchus crinitus* (Linn.). Great-crested Flycatcher.

151. *Empidias fuscus* (Bon.). Pewee.

152. *Contopus borealis* (Sw.). Olive-sided Flycatcher.

160. *Chordeiles popetue* (Vieill.). Night Hawk.

Fam. CYPSELIDÆ.

161. *Chaetura pelasgia* (Linn.). Chimney Swallow.

Fam. TROCHILIDÆ.

162. *Trochilus colubris*, Linn. Ruby-throated Humming Bird.

Fam. CUCULIDÆ.

163. *Coccygus Americanus* (Linn.). Yellow-billed Cuckoo.
164. " *erythrophthalmus* (Wils.). Black-billed Cuckoo.

Fam. PICIDÆ.

165. *Picus villosus*, Linn. Hairy Woodpecker.
166. " *pubescens*, Linn. Downy Woodpecker.
167. " *borealis*, Vieill. Red-cockaded Woodpecker.

This species is rare here, but I have a specimen obtained at Hoboken, N. J.

168. *Sphyropicus varius* (Linn.). Yellow-bellied Woodpecker.
169. *Hylotomus pileatus* (Linn.). Black Woodcock.

I possess one specimen killed at Hoboken. A few years ago it was not unusual to see specimens in our market (in the winter) sent from the northern part of Pennsylvania.

170. *Centurus Carolinus* (Linn.). Red-billed Woodpecker.
171. *Melanerpes erythrocephalus* (Linn.). Red-headed Woodpecker.
172. *Colaptes auratus* (Linn.). Yellow-shafted Flicker.

Fam. COLUMBIDÆ.

173. *Ectopistes migratorius* (Linn.). Wild Pigeon.
174. *Zenaidura Carolinensis* (Linn.). Common Dove.

Fam. TETRAONIDÆ.

175. *Cupidonia cupido* (Linn.). Prairie Hen.
176. *Bonasa umbellus* (Linn.). Ruffed Grouse.

FAM. PERDICIDÆ.

177. *Ortyx Virginianus* (Linn.). Virginia Partridge. Quail.

FAM. ARDEIDÆ.

178. *Demiegretta Ludoviciana* (Wilson). Louisiana Heron.
179. *Garzetta candidissima* (Jacquin). Snowy Heron.
180. *Herodias egretta* (Gm.). White Heron.
181. *Ardea herodias*, Linn. Great Blue Heron.
182. *Florida cœrulea* (Linn.). Blue Heron.
183. *Ardetta exilis* (Gm.). Least Bittern.
184. *Botaurus lentiginosus*, Steph. Bittern.
185. *Butorides virescens* (Linn.). Green Heron.
186. *Nyctiardea Gardeni* (Gm.). Night Heron.
187. *Nyctitherodius violaceus* (Linn.). Yellow-crowned Night Heron.

FAM. TANTALIDÆ.

188. *Ibis alba* (Linn.). White Ibis. Rare.
189. " *Ordii*, Bon. Glossy Ibis. Rare.

FAM. SCOLOPACIDÆ.

after taking off its skin I had the body cooked and was able to partake of a dish not usual in America. It probably came by the way of Iceland and Greenland, a route by which other European species occasionally reach us.

A friend of mine shot a large Woodcock near Newport, R. I., which weighed fourteen ounces; he was struck with its great size when it rose, but unfortunately did not preserve it. The probability is that it was of this species.

In Lewis's American Sportsman, Philadelphia, 1863, under the title Woodcock, he has in a foot note as follows: "G. D. Wetherill, Esq., informed us, a few days since, that a gentleman sent him, a year or two ago, a woodcock that weighed fourteen ounces, which was shot in New Jersey, and it was his intention to have had it mounted, but, owing to the negligence of the party who brought the bird, it was *too far gone* before he received it."

This no doubt was also the European species. Mr. Lewis says, the American bird is much smaller than the foreign, "in fact weighs fully one third less, seldom exceeding six or nine ounces; while the ordinary weight of the English cock is never less than twelve or fourteen ounces," etc.

In advance sheets of Prof. Baird's article on the Distribution and Migration of Birds, published in the Am. Journ. of Science and Arts, Vol. XLI., I notice that a specimen is recorded as obtained in Newfoundland.

191. *Philohela minor* (Gm.). American Woodcock.

Some years ago I saw a specimen of this species which was killed in the Park of the City Hall, opposite the Astor House; a gentleman who saw it come down, procured a gun, put it up and shot it. I started one many years ago from a gutter in Pearl street near Franklin square, a section of the city closely built up.

192. *Gallinago Wilsonii* (Temm.). English Snipe.

193. *Macroramphus griseus* (Gm.). Red-breasted Snipe.

194. " *scolopaceus* (Say). Long-billed Snipe.

Specimens of this species were obtained in market this year as early as the 20th of March, fully one month before the appearance of *M. griseus.*

195. *Micropalama himantopus* (Bon.). Stilt Sandpiper.
196. *Ereunetes pusillus* (Gm.). Semipalmated Sandpiper.
197. *Tringa canutus* (Linn.). Red-breasted Sandpiper.
198. *Calidris arenaria* (Linn.). Sanderling.
199. *Arquatella maritima* (Brunn.). Purple Sandpiper.
200. *Ancylocheilus subarquata* (Guld.). Curlew Sandpiper.
201. *Pelidna Americana* (Cass.). American Dunlin.
202. *Actodromas minutilla* (Vieill.). Least Sandpiper.
203. " *maculata* (Vieill.) Pectoral Sandpiper.
204. " *Bonapartii*, Schlegel. Bonaparte's Sandpiper.
205. " *Cooperi* (Baird). Cooper's Sandpiper.
206. *Symphemia semipalmata* (Gm.). Willet.
207. *Gambetta melanoleuca* (Gm.). Tell-tale.
208. " *flavipes* (Gm.). Yellow Legs.
209. *Rhyacophilus solitarius* (Wils.). Solitary Sandpiper.
210. *Tringoides macularius* (Linn.). Spotted Sandpiper.
211. *Philomachus pugnax* (Linn.). Ruff.

223. *Aegialitis melodus* (Ord.). Piping Plover.
224. *Squatarola Helvetica* (Linn.). Black-bellied Plover.

Fam. HAEMATAPODIDÆ.

225. *Haematopus palliatus*, Temm. Oyster Catcher.
226. *Strepsilas interpres* (Linn.). Turnstone.

Fam. RECURVIROSTRIDÆ.

227. *Recurvirostra Americana*, Gm. American Avocet.
228. *Himantopus nigricollis*, Vieill. Black-necked Stilt.

Fam. PHALAROPODIDÆ.

229. *Phalaropus Wilsonii*, Sab. Wilson's Phalarope.
230. " *hyperboreus* (Linn.). Northern Phalarope.
231. " *fulicarius* (Linn.). Red Phalarope.

Fam. RALLIDÆ.

232. *Rallus elegans*, Aud. Marsh Hen.
233. " *crepitans*, Gm. Clapper Rail.
234. " *Virginianus*, Linn. Virginia Rail.
235. *Porzana Carolina*, Vieill. Common Rail.
236. " *Noveboracensis* (Gm.). Yellow Rail.
237. *Fulica Americana*, Gm. Coot.
238. *Gallinula galeata* (Licht.). Florida Gallinule.
239. " *Martinica* (Linn.). Purple Gallinule.

Fam. ANATIDÆ.

240. *Cygnus Americanus*, Sharpless. American Swan.
241. *Anser hyperboreus*, Pallas. Snow Goose.
242. " *cærulescens*, Linn. White-headed Goose.

Under the Linnæan name of *cærulescens*, Mr. Cassin (Phil. roc. 1856, p. 42) has restored to specific rank the goose with uish wings and white head and neck, figured by Wilson and udubon as the young of *A. hyperboreus*. Well marked spenens in this plumage have been obtained on Long Island.

243. *Anser Gambelii*, Hartlaub. White-fronted Goose.

244. *Bernicla Canadensis* (Linn.). Canada Goose.
245. " *Hutchinsii* (Rich.). Hutchins' Goose.
246. " *brenta* (Stephens). Brant.
247. " *nigricans* (Lawr.). Black Brant.

There is a fine specimen of this species, rare on the Atlantic coast, in the Museum of the L. I. Historical Society, which was obtained on Long Island. It breeds in the Slave Lake region at the north, and migrates across the Rocky Mountains to the Pacific coast; an occasional straggler only coming eastward.

248. *Anas boschas*, Linn. Mallard.
249. " *maxima*, Gosse. Green-backed mallard.

This large duck described as a distinct species by Gosse, Birds of Jamaica, p. 399, and afterwards by Mr. J. G. Bell, under the name of *Fuligula viola*, in our Annals, is thought by many to be a cross between the mallard (*A. boschas*) and the muscovy (*Cairina moschata*). It may be a hybrid, but I do not consider its being so to be fully established by the evidence. As they come from the north their origin would necessarily be a domestic one, as *C. moschata* does not occur in a wild state north of Mexico, yet I have never heard of any in a state of ıore was in their company, but was not obtained; the male eighed 6¼ pounds, the female 4¾ pounds.

Mr. Gosse was aware that it was considered a hybrid, but ras by no means "free from doubt on the subject." Prof. aird (Pacific R. R. Reports, Vol. IX.) says, "it is generally ıpposed to be a hybrid with the muscovy (*C. moschata*), lthough from the constancy of its markings and the absence n the face of the peculiarities of the muscovy, it may be quesioned whether, after all, it be not entitled to specific rank."

It is much to be desired that information to establish its true tatus may yet be obtained.

250. *Anas obscura*, Gm. Black Duck.
251. *Dafila acuta* (Linn.). Pintail.
252. *Nettion Carolinensis* (Gm.). Green-winged Teal.
253. " *crecca* (Linn.). English Teal.
254. *Querquedula discors* (Linn.). Blue-winged Teal.
255. *Spatula clypeata* (Linn.). Shoveller.
256. *Chaulelasmus streperus* (Linn.). Gadwall.
257. *Mareca Americana* (Gm.). American Widgeon.
258. " *Penelope* (Linn.). English Widgeon.
259. *Aix sponsa* (Linn.). Summer Duck.
260. *Fulix marila* (Linn.). Large Broad Bill.
261. " *affinis* (Forster). Little Broad Bill.
262. " *collaris* (Donovan). Ring-necked Duck.
263. *Aythya Americana* (Eyton). Red-head.
264. " *vallisneria* (Wils.). Canvas-back.
265. *Bucephala Americana* (Bon.). Golden Eye.
266. " *albeola* (Linn.). Butter Ball.
267. *Histrionicus torquatus* (Linn.). Harlequin Duck.
268. *Harelda glacialis* (Linn.). South Southerly.
269. *Camptolaemus Labradorius* (Gm.). Labrador Duck.
270. *Melanetta velvetina* (Cassin). Velvet Duck.
271. *Pelionetta perspicillata* (Linn.). Surf Duck.
272. *Oidemia Americana*, Swain. Scoter.
273. *Somateria mollissima* (Linn.). Eider Duck.

274. *Somateria spectabilis* (Linn.). King Duck.
275. *Erismatura rubida* (Wils.). Ruddy Duck.
276. *Mergus Americanus*, Cassin. Sheldrake.
277. " *serrator*, Linn. Red-breasted Merganser.
278. *Lophodytes cucullatus* (Linn.). Hooded Merganser.

FAM. PELECANIDÆ.

279. *Pelecanus erythrorhynchus*, Gm. American Pelican.
280. " *fuscus*, Linn. Brown Pelican.

FAM. SULIDÆ.

281. *Sula bassana*, Briss. Common Gannet.

FAM. PHALACROCORACIDÆ.

282. *Graculus carbo* (Linn.). Common Cormorant.
283. " *dilophus* (Sw.). Double-crested Cormorant.

FAM. PROCELLARIDÆ.

284. *Aestrelata meridionalis* (Lawr.). Tropical Fulmar.

One specimen obtained on Long Island, see Annals, Vol. 5, p. 220.

285. *Procellaria leucorrhoa*, Vieill. Leach's Petrel.

293. *Stercorarius parasiticus* (Linn.). Arctic Skua.
294. " *Buffoni* (Boie). Long-tailed Skua.
295. *Larus glaucus*, Brunn. Glaucous Gull.
296. " *Hutchinsii*, Richardson. Hutchins's Gull.

I have a specimen procured on Long Island, which, at first, supposed was *L. glaucus*, but now consider it to be the young this species.

297. *Larus marinus*, Linn. Great black-backed Gull.
298. " *Smithsonianus*, Coues. Amer. Herring Gull.

Our common Herring Gull has been described as distinct om *L. argentatus* of Europe by Dr. E. Coues. (Proc. of Phil. cad. 1862, p. 296.)

299. *Larus Delawarensis*, Ord. Ring-billed Gull.
300. *Rissa tridactyla* (Linn.). Kittiwake Gull.
301. *Chroicocephalus atricilla* (Linn.). Laughing Gull.
302. " *Philadelphia* (Ord). Bonaparte's Gull.
303. *Xema Sabinii* (Sabine). Fork-tailed Gull.
304. *Gelochelidon Anglica* (Montagu). Marsh Tern.
305. *Thalasseus Caspius* (Pallas). Caspian Tern.
306. " *regius* (Gambel). Royal Tern.
307. *Sterna Trudeaui*, Aud. Trudeau's Tern.

Of this species no other specimen has been obtained since at of the type on the coast of New Jersey.

308. *Sterna Forsteri*, Nutt. Forster's Tern.

A few years ago, in the autumn, I found in Fulton Market veral specimens of this Tern, both adult and young, which me from Long Island.

309. *Sterna hirundo*, Linn. Common Tern.
310. " *macrura*, Naumann. Arctic Tern.
311. " *paradisea*, Brunn. Roseate Tern.
312. " *Antillarum*, Lesson. Least Tern.
313. *Hydrochelidon fissipes* (Linn.). Black Tern.
314. *Rhynchops nigra*, Linn. Black Skimmer.

Fam. COLYMBIDÆ.

315. *Colymbus torquatus*, Brunn. Northern Diver.
316. " *arcticus*, Linn. Black-throated Diver.
317. " *septentrionalis*, Linn. Red-throated Diver.
318. *Podiceps griseigena* (Bodd.). Red-necked Grebe.
319. " *cristatus* (Linn.). Crested Grebe.
320. " *cornutus* (Gm.). Horned Grebe.
321. *Podilymbus podiceps* (Linn.). Carolina Grebe.

Fam. ALCIDÆ.

322. *Utamania torda* (Linn.). Razor-billed Auk.
323. *Mormon arcticus* (Linn). Arctic Puffin.
324. *Uria grylle* (Linn.). Black Guillemot.
325. " *lomvia*, Brunn. Foolish Guillemot.
326. " *arra*, Pallas. Thick-billed Guillemot.
327. *Mergulus alle* (Linn.). Sea Dove.

EXPLANATION OF PLATE III.

XXXIII.—*Description of a new* REPTILIAN BIRD *from the Trias of* MASSACHUSETTS.

BY C. H. HITCHCOCK.

Read April 9, 1866.

FOR original description of the genus Tarsodactylus see Ichnology of New England, by Edward Hitchcock, 1858.

Tarsodactylus expansus.

Hind Foot.—Tetradactylous, three of the toes pointing forward: pachydactylous; hind toe reaching the ground only with its extremity on the inner side of the heel, or near the roots of the front toes. Hence it must have been inserted high upon the tarso-metatarsus. Divarication of the lateral toes 75°–80°; of the inner and middle 25°; of the middle and outer 50°; of the axis of the foot with the line of direction, the foot turned inward, 20°–25°. Distance between the rows of right and left tracks two to three inches. Length of the inner front toe one inch; of the middle, 1.43 inch; of the outer, 1.1 inch; of the claw, 0.12 inch. From tip to tip of the lateral toes, 1.5 inch; between the inner and middle, 0.75 inch; between the middle and outer, 1.2 inch. Projection of the middle toe beyond the rest 0.62 inch. Length of the foot, 1.7 inch; length of step by alternate hind feet, 2 to 4½ inches; by the right or left feet, 5 to 7 inches. Middle toe barely trails in one instance. Track ornithoid. Width of trackway 5.5 inches. Length of impression made by fourth toe 0.2 inch, about 0.4 inch distant from the foot, and on the inside.

Fore Foot.—Pentedactylous, pachydactylous; turned outward on the right hand side, forward on the left hand side. This irregularity is perhaps due to a curve in the line of the animal's progress. Divarication of the lateral toes, 100°; of the inner and second, 30°; of the second and third, 20°; of the third and fourth, 25°; of the fourth and fifth, or outer, 25°–30°. Length of the outer toe from the middle of the posterior part of the foot, 0.37 inch; of the fourth toe, 0.6 inch; of the third, 0.75 inch; of the second, 0.8 inch; of the inner toe, 0.48 inch. From tip to tip of outer toes, 1 inch. Width of toes, 0.2 inch. Foot reptilian. There is one slight caudal marking in the middle of the trackway, indicating the possession of a long slender tail.

Remarks.—This species differs from the *T. caudatus*—the only one described—in the greater divarication or spread of the toes; its inferior size, being from one fourth to one half smaller; and thirdly, its mode of progression is irregular and it does not trail its claws in the mud. The *T. caudatus* walks as regularly as a turtle. The claws of the hind toes are very large—almost pellets. The front feet of the two species appear to correspond perfectly except in size.

Locality.—Ferry above Turner's Falls, near Greenfield, Mass. The specimen described is in the private cabinet of the Author.

XXXIV.—*On the Young Stages of a few Annelids.*

By Alexander Agassiz.

Read June 25, 1866.

The study of immature animals has become so important that, before proceeding to my subject, it may be of some interest to those engaged in investigating marine animals, to know how the young may be collected. Johannes Müller was the first who successfully employed surface dredging with a fine gauze hand-net; he has been followed with eminent success by many of his pupils, and now scooping the surface of the sea in search of diminutive animals, scarcely to be recognised with the naked eye, is one of the most profitable sources of supply for recent investigators at the sea-shore. Baur[*] has introduced fishing with the gauze net by sinking it to any desired depth, and this promises to be a fruitful mode of finding what cannot be reached with a hand net. Meyer and Möbius,[†] in their investigations of the Fauna of the Bay of Kiel, have even attempted, with remarkable good fortune, to pump up from the vicinity of the bottom any animals there abounding.

As a rule, the habits of the young marine animals are so utterly different from those of the adult, that we cannot expect to find them together, and must not search for the young in the retreats where lie concealed the adult Crustacea, in the mud-flats or sandy beaches where are buried Annelids and Mollusca, along the rocky shores where so many Gasteropods abound, or under sea-weeds and stones, the hiding-places of both Annelids and Mollusks, as well as Crustacea. We must not look in rocky pools frequented by Starfishes, Sea-urchins, and the like, for young Echinoderms; the young Polyps are not always to be found growing up by the side of their parents; neither can we expect to find the young Cod, Goose-fish, Lump-fish, Flounder, Cottoids, and Perches, on the feeding-grounds frequented by the fishermen in search of the adult. The young fishes abound close in shore, along sandy flats heated by the sun, seeking to avoid the dangers which would beset them in deeper waters, and they can scarcely be recognised for what they really are except by the most practised eye. Thus the earlier stages of most marine animals are passed under circumstances totally different from those of the adult. When the adults are sedentary in their habits, and capable of very limited motion, the young are almost always endowed with corresponding freedom, leaving them entirely at the mercy of the winds and currents. On the contrary, in the class where we have the greatest freedom of movements and least sedentary habits, we find the young, for the most part, fixed to the ground and incapable of any motion. What greater contrast can there be in this respect than the early stages of Hydroid Medusæ, when, plant-like, they remain for ever attached to one spot, embryo Mollusks, both very different in appearance and in their habits from the adults.

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[*] Baur, A. Beiträge zur Naturgeschichte der Synapta digitata; in Verhandl. der K. L. C. D. Akad. 1864.

[†] Meyer, H. A. u. Möbius K. Fauna der Kieler Bucht.

From the few complete embryologies we possess of the lower marine animals, it is apparent that there has not been, up to this time, any systematic method of working. Artificial fecundation can do much towards adding to our knowledge of the early stages of marine animals, but any one who has lived at the sea-shore and endeavored to keep alive these tiny creatures, will soon find in this method insurmountable obstacles to pursuing his investigations beyond very narrow limits. The only way is to go to the fountain head at once, to make oneself familiar with the currents at all hours of the tide and under all possible influences of wind; to notice the place where opposite currents meet, and throw into long bands the wealth of animal life they have swept along; to become so perfectly familiar with what you may expect to find under certain conditions, that no time shall be lost in looking for the most favorable spot which otherwise you would only stumble upon accidentally. The habitat of the adult animals should be carefully observed, so that by surface dredging with the fine gauze hand-net in the vicinity of their abodes, and by a close attention to the direction which the currents take from these places, at the time of breeding, we can often obtain specimens at all ages and of all sizes, till they have ceased to be nomadic or have assumed the habits they retain in their adult condition.

According to the nature of each locality spots are easily found where the currents which skirt along the shores are compelled to pass. Projecting points of land are barriers during certain hours of the day, and everything brought floating with the tide along their shores will accumulate, until it forces its way round or over the obstacles. Narrow passages between islets and the shore, through which the tide rushes with great rapidity, will give us a synopsis as it were of all that can be found in the vicinity. When the wind blows constantly from the same direction, it will heap up on the lee shore anything floating on the surface, so that frequently the examination of a few rods will give us at once what otherwise we should find only after a protracted search.

Violent storms which throw upon the beaches masses of sea-weed, furnish a rich harvest of small animals, attached to the fronds, or concealed between the roots, only to be found in hiding-places inaccessible at other times. The roots of Laminaria are the resort of thousands of young Echinoderms, Annelids, Crustacea, and Mollusks, after they have ceased to swarm near the surface of the water, and have assumed somewhat the habits of the adult. Not even the dredge will root these up, and we must snatch at the favorable chances an opportune storm throws in our way.

I have already shown in my different papers on the Embryology of Echinoderms* and Acalephs,† how useful knowledge of this kind proved in order to complete missing links in the history of their development. In the following pages will be given some of the results obtained for a few Annelids by a similar mode of procedure.

from the adult; according to Siebold,[*] Schmidt,[†] and Quatrefages,[‡] they differed principally in size, and no trace of metamorphosis could be seen; similar results have been obtained by Van Beneden,[§] Keferstein and Ehlers,[‖] and Claparède.[¶] Müller's observations first showed the existence of a metamorphosis in Panaria, while Leuckart and Pagenstecher[*2] subsequently proved beyond doubt the existence of still more striking changes in Pilidium, of a sort of alternate generation giving rise to Nemertes, as previously suggested by the observations of Müller,[†2] Busch,[‡2] Gegenbaur,[§2] Wagener,[‖2] and Krohn;[¶2] changes reminding us of a somewhat similar process in the development of an Echinoderm from a Pluteus. To these evidently dissimilar modes of development I still have to add the transformations of Nareda, as shown in a subsequent part of this paper, resembling the usual mode of development of Annelids; also a sort of retrograde development of a species of Planaria quite analogous to that more fully described in Nareda, where we have a gradual extinction, with advancing age, of very distinct articulate features of the young. As in Nareda, we find in this Planaria plainly marked articulations when young, which become less and less distinct with advancing development, a striking contrast to the evolution shown to exist in Planarians by Müller, and to the usual mode of growth in this family where the young so early resemble the adult.

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[*] SIEBOLD, K. T. v. Wirbellose Thiere; in *Siebold* u. *Stannius* Vergleichende Anatomie, p. 171.

[†] SCHMIDT, E. O. Die Rhabdocœlen Strudelwürmer des Süssenwassers, beschrieben u. abgebildet. 1848.

[‡] QUATREFAGES, A. de. Mémoire sur quelques Planaires marines; in Ann. Scien. Nat. 3me. Ser. 1845. IV.

[§] VAN BENEDEN, P. J. Recherches sur la Faune littorale de la Belgique. Turbellariés de la côte d'Ostende. 1860.

[‖] KEFERSTEIN, W. u. EHLERS, E. Zoologische Beiträge gesammelt im Winter 1859–60, in Neapel u. Messina. 1861.

[¶] CLAPARÈDE, A. R. E. Beobachtungen ueber Anatomie u. Entwickelungsgeschichte wirbelloser Thiere, an der Küste von Normandie angestellt. Leipzig, 1863.

[*2] LEUCKART, R. u. PAGENSTECHER, AL. Untersuchungen ueber niedere Seethiere. Pilidium die Larve einer Nemertine; in Arch. f. Anat. u. Phys. 1858. p. 569, Pl. XIX.

[†2] MÜLLER, J. Ueber verschiedene Formen von Seethieren: in Arch. f. Anat. u. Phys. 1854. p. 81.

MÜLLER, J. Bericht ueber einige neue Thierformen der Nordsee; in Arch. f. Anat. u. Phys. 1846. Pl. V.

[‡2] BUSCH, W. Beobachtungen ueber Anatomie u. Entwickelung einiger Wirbelloser Thiere. Berlin. 1851.

[§2] GEGENBAUR, C. Bemerkungen ueber Pilidium gyrans, Actinotrocha branchiata und Appendicularia; in Zeitschr. f. Wiss. Zool. 1853. V. p. 346.

[‖2] WAGENER, R. Ueber die Mesotrocha sexoculata v. Wilh. Busch; in Arch. f. Anat. u. Phys. 1847. p. 187.

[¶2] KROHN, A.; in Archiv f. Anat. u. Phys. 1856. p. 78.

KROHN, A.; Ueber Pilidium u. Actinotrocha; in Archiv f. Anat. u. Phys. 1858. p. 289.

On examining a string of eggs, mistaken at first for those of some naked Mollusk, I was surprised to find young Planariæ in different stages of growth with a ramifying digestive cavity, somewhat similar to that of adult specimens, but showing besides one distinct articulation for each spur of the digestive cavity. The eyes were well developed, and when the young scarcely necessary to refer to the opinion advanced by Girard,[*] that the Planarians are naked Gasteropods.

ON THE ADULT OF LOVÉN'S ANNELID LARVA.

(Nareda *Gir.*) ?[†]

Although Lovén was the first to publish observations on the development of Annelids proper, as early as 1842,[‡] when he traced the development of an Annelid, supposed at the time to be the larva of some Nereis-like animal, yet up to the present day, his observations have not been confirmed in spite of the many memoirs we now possess on the metamorphosis of several families of true Annelids. Milne Edwards, who followed closely upon Lovén with a most exhaustive history of the development of Terebella,[§] laid the foundation of generalizations on the mode of formation and norm of succession of rings in the young Annelids, which subsequent observations have completely confirmed; these were somewhat different from what would seem to be logically deduced from the observations of Lovén, so that it is of considerable interest to have the observations of the latter repeated, to show that the development of this larva does not differ very materially from the general mode of evolution observed in other Annelids.

The large disk of the anterior extremity in Lovén's larva was considered by Milne Edwards as simply due to the distension of that portion of the young Annelid, similar to what he had often observed in some of the younger stages of Terebella while in motion. Larvæ with similar disks have since been observed by Sars, Busch, Müller, and Claparède, which are known to be the young of Polynoe. It was, therefore, to judge from the general resemblance of these larvæ, most natural to associate Lovén's larva with those of Polynoe, as has been done by Claparède in his classification of Annelid Larvæ. From what is shown hereafter—and we have, as far as I know, no exceptions to this in the embryology of Annelids—there are points of difference showing at once that the association is not a natural one. The oldest stage figured by Lovén has as yet no trace of any feet or bristles, and the only feature by which it might possibly be associated with the Nereidæ or Euniceæ, as has been done by Lovén, is the presence of two short antennæ at the anterior extremity. We should expect, from what has been shown thus far by all writers on young Annelids, to find in somewhat more advanced stages, that these tentacles have considerably increased in length; but such is not

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[*] GIRARD, CH. Researches upon Nemerteans and Planarians. I. Embryonic Development of Planocera elliptica; in Jour. Acad. Nat. Sciences. Phil. 1854.

GIRARD, CH. On the Development of Planocera elliptica; in Proc. Bost. Soc. N. H. III. p. 348.

[†] GIRARD, CHAS.; in Synopsis of Marine Invertebrates of Grand Manan, by *W. Stimpson*; in Smithson. Cont. 1853.

[‡] LOVÉN, S. L. Jakttagelse öfser metamorfos hos en Annelid; in K. Vet. Akad. Handl. Stockholm. 1840. p. 93.

LOVÉN, S. L. The same, translated by W. Peters, in Archiv f. Naturg. 1842. I. p. 302; also in Ann. d. Scien. Nat. 2me. Ser. 1842. XVIII. p. 288.

[§] EDWARDS, H. MILNE. Observations sur le dévelopment des Annélides; in Ann. d. Scien. Nat. 1845. III. p. 145.

Annelid belonged; while it is this very absence of feet and bristles, as well as the distinct separation of the digestive cavity into œsophagus, stomach, and intestine, plainly described by him in his young worm, which should have guided him, as well as subsequent writers on this subject, in referring the larva to its proper place. Had it not been for the deceptive appearance caused by the temporary presence of antennæ and their resemblance to Polynoe larvæ, this would undoubtedly have been done long ago, especially when taking into consideration the differentiation of the digestive cavity, so prominent in Lovén's larvæ; this separation takes place in other Annelid larvæ, long after the family and sometimes even the generic characters have been fully developed. The early growth of bristles and the resemblance of the young larvæ of Polynoe to the adult, at so young a stage, should at once have directed attention to such an anomalous type as that of Lovén's, having no feet or bristles long after the young worm had lost its embryonic character, as well as all trace of the row of vibratile cilia round the head.

The passage of Lovén's figures from the condition with a disk to the most advanced stage he observed is somewhat abrupt. I have been able to supply this defect in the observations given below. See Figs. 7-16. Although my larvæ differ somewhat from those of Lovén, there can be no question of the family identity of the two. In the youngest larva, Fig. 3, we find, as observed by Lovén, no trace as yet of any articulations; but we have besides the large circle of vibratile cilia round the anterior extremity (*v*) described by Lovén, a similar powerful ring (*v*′) round the posterior extremity. This anal circle either does not exist in Lovén's larva or must have escaped his attention. Our larva is like Lovén's, transparent as glass; it has in addition, following the course of the two vibratile rings, a single row of most brilliantly colored orange pigment spots of different shades and sizes; similar pigment spots are scattered in three unequal rows along the unarticulate body, between the anal and anterior vibratile chords; there is besides a crescent-shaped row of spots along the posterior edge of the mouth (*m*). The two jet-black eye-spots (*e*) on each side of the summit of the disk are also found in our larva (seen only when facing the ventral or dorsal side, as in Fig. 7). The eyes have a totally different appearance from the other pigment spots found along the body and vibratile rings. They are apparently connected with a nervous ganglion sending off delicate branches to the anterior vibratile ring. The mouth opens behind the anterior vibratile chord, leading into a well defined œsophagus communicating with a stomach, which is distinctly separated at its posterior extremity from the intestine; the latter opens externally in the middle of the anal vibratile chord, placed at the base of the anal ring; this is slightly conical, and projects somewhat beyond the vibratile chord.

Lovén distinctly states that the rings are formed immediately at the base of the anterior disk, behind the mouth; this is probably an error of observation, owing to the advanced period at which the articulations first commence, or the rings are simply folds due to contraction. He describes all the rings of his young frequently been observed in our own larvæ, and those thus showing this apparent division (succeeding a stage where nothing of the sort existed) invariably died soon afterwards, as was the case with Lovén's young Annelids.

As far as I could ascertain, a number of rings make their appearance at once (Fig. 4), and are the more distinct the nearer they are placed to the mouth; they appear at first like faint transverse lines, readily mistaken for furrows formed by contraction. In the present stage, Fig. 4, we find otherwise no striking difference from the previous one; the posterior part is somewhat more elongated, and we have the lines of ventral and dorsal spots increased in number. With the growth of the larvæ the pigment spots of the body become smaller and more irregularly scattered (Fig. 5), while there is no diminution as yet in the size and brilliancy of the pigment spots of the oral and anal vibratile rings. As the body elongates the articulations become more distinct, the digestive cavity narrower, and the disproportion in width between the oral disk and the diameter of the body attains its maximum in the present stage; the anal ring has become somewhat more prominent than in the previous stage. The part of the body, as yet not divided into rings, can be plainly seen in Fig. 6 placed next to the anus; the whole of the stomach is lined with powerful vibratile cilia, particularly well developed at the opening of the œsophagus into the stomach, and at the beginning of the intestine, *c*. Fig. 6.

There appear at the stage of Fig. 4. in front of the eyes, two small tentacles (*t*) (as observed by Lovén), placed nearly at the extremity of the young worm. The body of the larva now takes a rapid development, and in the stages next represented here, Fig. 7 (which with the previous stage, Fig. 5, are phases not fully described by Lovén), we find as many as forty-three rings, and the pigment spots of the body more numerous than in previous stages. The lengthening of the body is accompanied by a decrease in the relative size of the anterior disk, no longer so much out of proportion as to give the larva the hammer shape it possessed before; the part of the disk anterior to the vibratile ring has somewhat elongated; the mouth (*m*) when seen from the ventral side, Fig. 8, appears quadrangular with rounded edges; it is situated close behind the anterior vibratile chord, and edged on the posterior extremity with a row of large pigment cells.

We now come to a series of changes plainly showing the passage from the stage represented by Lovén in his Fig. 5 to that of his Fig. 6. Although the body of the young worm is much elongated, the number of rings, Fig. 9, has not greatly increased; they are further apart, and there is a tendency in the stomach, which occupies nearly the whole width of the body, to become folded, so as to correspond to the articulations; the anterior part of the head has greatly elongated, and the general appearance of the young worm reminds us somewhat of the larva of *Sipunculus nudus* figured by Keferstein and Ehlers. The vibratile rings are greatly reduced, the antennæ have slightly increased in length, and the head of the worm presents a certain resemblance to a Nereid or some have further diminished in size as well as number, the convolutions of the digestive cavity are more distinct, the antennæ have decreased in length, and the vibratile rings have lost their former power. In a subsequent stage (Fig. 11) the head has become more distinct, the anterior vibratile ring scarcely exceeds the diameter of the body, and the antennæ are quite prominent. The little worm is only rarely fished up in this stage, swimming about very slowly, and becoming somewhat more active when creeping upon the bottom, where they now prefer to remain. This is their most advanced nomadic stage, and from their subsequent habits it is necessary to keep them in confinement in order to follow their later changes.

We find in Fig. 11 the pigment spots becoming smaller than in preceding stages; the convolutions of the digestive cavity, which has acquired a light yellowish coloring, are extremely well defined. Up to this time we have still no trace of feet, bristles, or appendages of any sort, except the two tentacles of the head; and, were it not for these, it would seem as if the young worm were the larva of some Nemertes-like animal, notwithstanding the different development of Nemerteans observed by Müller,[*] Busch,[†] Gegenbaur,[‡] Krohn,[§] Wagener,[‖] Leuckart and Pagenstecher,[¶] and others, which, when we know more of the general plan of development of Annelids, may after all not present any greater differences when compared to the present type of growth, than we find in the embryology of Echinoderms, between the plutean and sedentary mode of development. There can be no doubt that we have in Annelids as in Echinoderms closely allied genera undergoing a widely different metamorphosis, an additional analogy between these two classes, but not, it seems to me, a sufficient reason for uniting Echinoderms with worms, as has been urged with so much ingenuity by Huxley. The observations of Desor* hint at some such widely different transformation for the Nemerteans, but his observations are too inaccurate to afford any data for a satisfactory analysis.

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[*] MÜLLER J., l. c., in Archiv f. Anat. u. Phys., 1847.

[†] BUSCH W., Entwickelung u. s. w. l. c., p. 107.

[‡] GEGENBAUR C., l. c.; in Zeitsch f. Wiss. Zool., 1853, V. p. 346.

[§] KROHN A., l. c.; in Archiv f. Anat. u. Phys., 1856, p. 78.

[‖] WAGENER R.; in Archiv f. Anat. u. Phys., 1857, p. 204.

[¶] LEUCKART u. PAGENSTECHER; in Archiv f. Anat. u. Phys., 1858, p. 569.

The persistence of the antennæ and absence of feet and bristles would show that it belonged to some genus of annelids as yet not described, the only annelid without setæ being Phoronis of Wright,† but with which, from the descriptions given by Allman in his Fresh-water Polyzoa,‡ and by Van Beneden,§ it has not the slightest relationship. On examining subsequent stages this stumbling block is found gradually to vanish by a sort of retrograde development; and as the little worm grows older, it loses little by little the embarrassing appendages, and shows in the most advanced stages thus far observed, a tolerably close resemblance to such well known Nemerteans as the Nareda of Girard‖ and some of the species of Polia figured by Quatrefages¶ in the Voyage en Sicile, although as yet I have not been able to trace in the embryo worm anything of the complicated structure of the Nemerteans.

The oral and anal vibratile cilia disappear rapidly (Figs. 12, 13), the head becomes more rounded, the antennæ having attained their maximum size (Figs. 12, 13) grow less and less prominent, and rapidly vanish, so that the head of the young worm has now the shape of Fig. 14, which was its condition four months after the stage represented in Fig. 11. The articulations have become obliterated, no trace can be found of the pigment spots, which have gradually grown smaller and less numerous, and the young worm in its motions and attitudes reminds us strongly of Nemertes and the like Annulata. About a month later the head is even less prominent, and is separated from the body by the characteristic neck of the Nemerteans, the tentacles having altogether gone, the only trace of them being very slight swellings on each side of the head. The young worm loses at the same time its cylindrical shape, and in Fig. 14 has already become greatly flattened. This is quite well shown in Fig. 16, a profile view of Fig. 15. The young Nemertean is now nearly half an inch long, and is usually found slightly coiled on the bottom of the jar in which it is kept; on being disturbed their motions are somewhat like those of the Nemerteans. The posterior extremity is much smaller than the anterior, the width of the worm increasing towards the head. As it grows older this difference is lost, the head becomes still less prominent, and finally in Fig. 17, when the young worm is five months older than Fig. 11, the width of the head is less than that of the body, and the eyes have moved nearer the neck.

There is but little doubt from the foregoing observations, that Lovén's larva becomes eventually a Nemertean, closely allied to Polia; my oldest larvæ were, however, far from being adults, and their generic affinities cannot be more closely intimated at present. There is little exceptional in the development of the larva from that of the other Annelids, as has been maintained, and like other Annelids it early assumes the features of the adult, and new rings are developed next to the anal ring, in accordance with the observations of all writers on the subject.

SPIRORBIS SPIRILLUM, *Gould* (non *Pagenst.*; an *Lam.* ?)

The history of the development of Spirorbis has been given in full by Pagenstecher;* I bring up the subject here to show some differences in our observations, quite important as far as they bear upon the mode of development of the tentacles, and refer to a few features respecting the peculiar tendency of the development in these Annelids which has not been sufficiently dwelt upon.

The species to which my observations are limited is found attached mainly upon Fucus; it is undoubtedly the *Spirorbis spirillum* of Gould,† but judging from the differences existing between specimens of our coast, and the descriptions of Pagenstecher, it certainly is not the *S. spirillum* of Lamark investigated by him; the shape of the bristles of the three large clusters on the collar is totally different, as well as the arrangement of the small rods of the collar, which in our species form a single well defined loop, placed immediately of bristles (as in Fig. 25), or else when the strings have been laid they are found on the sides of the body, between it and the limestone tube, and here the young undergo their transformations. This is contrary to the statements of Pagenstecher, who says the young undergo their development in the funnel-shaped tentacle, used thus as a sort of breeding case; it is, however, more in accordance with what we know of the method of laying eggs within the tube in which they live, in Terebella, Serpula, and Protula.

As is already known from the observations of Milne Edwards on Protula, the young lead a nomadic life but a short time, and soon build a tube in which they live and complete their growth. Pagenstecher has observed the same thing for Spirorbis, and it would appear from my own observations that the nomadic life of Spirorbis is not longer than eight or ten hours. The young Spirorbis has attained quite an advanced stage of growth when it leaves the tube of the parent and swims freely about (in search of a place of attachment) during a night at the outside; even with specimens kept in confinement, in perfectly clean glass vessels, the young escaping from the egg cases are rarely caught while swimming about; it frequently happens during a night that the smooth sides of the vessel are completely covered with small limestone tubes, formed by the young Spirorbis hatched since the evening before.

We may perhaps find in our Spirorbis the explanation of the anomalous development of *Terebella Medusa** observed by Bate in what he calls uterine sacs, which may prove identical with the tubes containing the eggs and forming strings (Fig. 18) which I have observed in this species, placed on each side of the alimentary canal, in the naked part of the body immediately behind the collar. The young are quite advanced within the body of the parent, previous to the transfer of the egg sacs to the cavity of the tube, where they complete the greater part of their growth. Bate says these sacs pass through the intestinal canal into the tube; this seems scarcely possible, but in whatever manner this may be done, the strings of eggs find their way whole from the sides of the alimentary canal to the cavity of the tube.

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* Bate C. S.; Terebella Medusa; in Ann. and Mag. Nat. Hist., 1851, VIII., p. 237.

As I shall have to refer constantly to the development of the tentacles in Terebella, as observed by Milne Edwards, I give here a short description of an identical mode of development in one of our common species—the *Terebella fulgida Agass.*[*] The figure is taken at a time when there are but five tentacles, and no signs of the branchiæ; these are only developed much later, when there are no less than from sixteen to eighteen tentacles, and are at that time short processes with very simple bifurcations appearing at the extremity. In the condition here figured, Fig. 19, our young Terebella closely resembles Figure 24 of Milne Edwards, at the time when, as shown by him, they are more closely allied to rapacious Annelids, before they lose their embryonic characters, and acquire more distinctly those of the adult. The eyes are still in prominent clusters and not yet formed into a ring round the collar, as they are arranged while gradually disappearing; below them we fifth ring. The description given by Stimpson* of the genus Lumara agrees so well with some of the stages of Terebella, that I am inclined to consider it only as an embryonic condition of some allied Terebella. Long after the stage here figured, even when the branchiæ have become quite well developed, it is very common to fish up with the dip-net these young Terebellæ, which are capable of a certain amount of motion by the contortions of the tentacles and body. They build their cases very late, and frequently leave them to climb about on eel-grass, piles, etc., making considerable progress with the aid of their tentacles, by which they drag themselves along.

Pagenstecher has invariably represented the tentacles of the anterior extremity of Spirorbis as developing symmetrically and in pairs. This is not the case in our species, where they are formed very differently from what has been thus far observed in this family. We have between these two modes of growth a difference similar to that existing between *Terebella nebulosa* and *T. conchilcga*, where in one case the tentacles appear successively, while in the other they are formed in pairs. The oldest tentacles of our Spirorbis are formed on the outside, new tentacles appearing successively singly nearer the median line on alternate sides, and not in pairs; the corresponding tentacles on each side of the middle line being of very different lengths. This want of symmetry is readily seen in the youngest specimens figured, Figs. 20, 21, 22; and though it is more difficult to trace this in older stages (Fig. 25), the presence of the simple opercular tentacle always introduces a prominent asymmetrical element, soon lost in the more advanced stages of the development of Terebella. The two eyes are quite prominent, and can generally be traced in the adult, although they are not as striking as in the younger stages; the ocular spots are always limited to two, and we find at no time either a ring or clusters of eye-specks.

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* STIMPSON W. Marine Invertebrates of Grand Manan. 1853. p. 30.

The first tentacle appears on the right, Fig. 20 t_1, next comes the corresponding tentacle of the left, and only later, Fig. 21, the rudiment of the odd opercular tentacle (t_0, Fig. 22), covering in Figure 21 the right tentacle. The bristles make their appearance in figure 21, where we find two of the three bundles of the collar-like projection of the anterior extremity, always distinctly marked in such young embryos. In the next stage the collar is more prominent, and an additional bristle is found representing the third bundle of the collar (Fig. 22). The posterior extremity has lengthened, the anal cirri have nearly disappeared, and a couple of very indistinct articulations can be traced behind the collar. There are also two additional tentacles placed between the first pair, which readily show in what order they have appeared t_2, t_3 (the opercular tentacle always retaining its peculiar shape).

In subsequent stages, Fig. 23, the posterior extremity has lengthened but slightly. There are along the side of the posterior part of the body a couple of bristles similar to those of the adult; we can trace the first stage of the bifurcation of the four tentacles at their extremity, rendering the age of the tentacles

The principal changes take place almost exclusively in the anterior extremity; the posterior part of the body does not lengthen until the collar and tentacles may be said to be fully developed, and although we find papillæ on the sides of the posterior part of the body, similar to those forming the single loop of the collar of the adult, as well as the peculiar scythe-shaped bristles of each ring; yet the young Spirorbis has, up to this time, passed through no phase of growth during which the increase of the posterior part was in the least to be compared with the changes of the anterior extremity. In nearly all other Annelids we find the posterior extremity playing a much more prominent part in determining the shape of the young worm. This is undoubtedly due to the shortness of their nomadic life; and though capable of active movements during that period by means of the collar, their freedom soon comes to an end, and they complete their development after having assumed the habits of the adult.

POLYDORA *Bosc* (Leucodora *Johnst.*).

Claparède having given in his Beobachtungen a very complete history of the development of what he calls Leucodora ciliata, the following observations would be superfluous as far as they relate to new phases in Polydora, but may be useful in clearing up the confusion existing concerning the identity of Leucodora *Johnst.* and Polydora *Bosc.* Quatrefages, in his Synoptic Table,* has introduced these two genera as distinct, and separates them on account of the remarkable structure of the bristles of the fifth ring in Polydora, which he says is not to be found in Leucodora; this must evidently be a mistake, as Johnston's figure† certainly possesses the peculiar bristles of the fifth ring as maintained by Claparède in his Beobachtungen. Yet notwithstanding this correction of Quatrefages by Claparède* in his review of the System proposed by the former, and the accurate description given by him (Claparède) in Müller's Archiv† of *Polydora cornuta*, we find him associating with the genus Polydora in his embryology of *Leucodora ciliuta*, a genus which is certainly not Polydora, as he himself has limited it, but may be a species of Spio or Nerine, or perhaps what Quatrefages understands by Leucodora. At any rate it is self-evident from the following embryology of a species of true Polydora, and of a species of what Claparède has called Leucodora in his Beobachtungen, that we have in each developed at a very early period, genuine characters which refer undoubtedly one form to Polydora, and the other to a different genus (Leucodora *Clap.* non *Johnst.*), probably Nerine *Johnst.* Thus proving the assertion of Quatrefages‡ of the generic difference between Leucodora *Clap.* and Polydora *Bosc.* And yet in spite of this generic difference, Claparède was correct in maintaining the identity of Leucodora *Johnst.* and Polydora *Bosc*, as can be readily seen on examining the descriptions and figures of Bosc,§ Johnston, Oersted,‖ Leuckart,¶ Claparède, and Keferstein.*[2] The error arises from Claparède's mistaking for

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* QUATREFAGES A. DE. Note sur la classification des Annélides; in Comptes Rendus. 27 Mars. 1865.

† JOHNSTON GEO. Miscellania Zoologica; in Mag. Zool. Bot. 1838. ii. p. 66.

Bosc, but to some closely allied genus, as suggested above. It is not probable that such an accurate observer as Claparède would have overlooked this segment, so prominent in the youngest specimens of our Polydora, as well as the presence of the glands, so early developed in the young worm, and which he noticed in his description of the adult in Müller's Archiv. In my earlier observations I made a similar mistake between young of Polydora and Nerine, and it was not till the striking difference of the fifth ring and the presence of glands was noticed, that I could afterwards always readily distinguish the young of these two genera, so easily mistaken at first sight.

I shall introduce a few of the stages of Nerine, with a short description of the adult, for the sake of comparing them with the different stages of Polydora, which will be given more in detail, and of identifying them, as far as possible, with those observed by Claparède. It is apparent at first glance, on comparing his drawings of Leucodora with those here given of Nerine and Polydora, that they represent closely allied genera; but as similar young stages of other genera have also been figured by Leuckart and Pagenstecher as Spio, as well as by Busch and by Frey and Leuckart,* the adults of which are not known, we must be exceedingly careful in our identifications of apparently closely related forms, and give these identifications more as hints for future observers, than as positive statements.

The young of Polydora and Nerine, like the young of Leucodora *Claparède*, are kept in confinement with the greatest ease; hence the possibility of tracing the changes of growth in a connected manner until they have assumed unmistakably the features and habits of the adult, and built their cases on the bottom of the jars where they are confined. The youngest stages observed, Fig. 26, are considerably more advanced than those of Claparède, having already lost, if they ever possessed them, the bunches of ringed bristles so characteristic of the younger stages of many Annelids, such as Leucodora *Clap.*, Nerine, and Spio. The tentacles of the head are developing, and there remain but slight traces round the head and anus of the former rings of vibratile cilia, as well as very narrow bands of short vibratile cilia on the dorsal side; similar bands are found on the lower side composed of larger cilia, which greatly assist in locomotion. These bands are less powerful towards the extremities, being greatly developed towards the middle, especially on the lower side. The vibratile ring surrounding the anus is less prominent than in Claparède's embryo; the anterior and posterior rings of cilia, as well as the transverse bands, diminish rapidly in size with advancing age, so much so that in Fig. 28 they have almost totally disappeared. In the youngest stage seen, Fig. 26, there are four well developed anterior rings, each provided with an upper and lower bunch of bristles, the dorsal bunch being the longest, and diminishing in length as it recedes from the head, the lower bunches consisting of bristles of the same length; the fifth ring (r_5) is much wider than any other, and has only three short, stout bristles on each side; then comes the sixth head; this is rendered more brilliant by its contrast with the black pigment spots well developed on the head and first ring, and taking their greatest prominence on the sixth, seventh, and eighth, gradually diminishing to a few isolated dots near the anus. On the head it is almost impossible to distinguish the eyes proper from the pigment spots; it is, however, evident that the eyes are more numerous in the young than in the adult, which is the case with many other Annelids as observed by Milne Edwards, Agassiz, and Claparède. The identity of the pigment spots and eyes has been suggested by Claparède, who could discover no difference between them, and we have perhaps, in the pigment spots scattered over the whole surface of the body, something analogous to the presence of eyes in Fabricia at the anal extremity. The distribution of the pigment spots of Polydora is quite different from that of Leucodora, observed by Claparède and by myself in Nerine; in the latter they are more abundant and intense in the anterior extremity, while in Polydora they take their maximum development from the middle of the body towards the posterior part, leaving the anterior extremity, with the exception of the head, nearly colorless.

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* Frey H. u. Leuckart R. Beiträge zur Kenntniss wirbelloser Thiere. Braunschweig, 1847. Pl. 1, Fig. 19, p. 98.

The mouth opens by a longitudinal slit formed by the thickening of the lips, into an ill-defined œsophagus extending to the fifth ring, and then reopening into a digestive cavity terminating at the anus, and not yet divided into a true stomach and intestine.

In the next stage, Fig. 27, we find no material change in the anterior part, with the exception of the slight increase in length of the tentacles, the diminution in number of the pigment spots round the eyes, and their increase on the four anterior rings. The posterior part has considerably increased in size, a number of additional rings having been formed in front of the anal ring; the pigment spots are now arranged in two regular rows, the dorsal cirri have not increased in size, but we find in the seventh and succeeding rings, at the base of the bunch of thin bristles, two hook-shaped bristles instead of one. The œsophagus is more clearly marked than in the preceding stage; the glands are found in all the rings except the last. In the following stage, Fig. 28, there has been a still further growth of the tentacles, and we find the pigment spots arranged both above and below in four parallel rows, the outer rows being the smaller and less prominent. There are now four hook-shaped bristles at the base of each of the dorsal cirri, which are readily recognised as such in the rings immediately following the seventh. The bunches of long bristles of the four anterior rings are gradually losing their prominence, becoming less numerous in the present stage, and are replaced by bristles similar to those of the other bunch. At this period the number of rings does not increase rapidly; the principal changes are confined to the growth of the dorsal cirri and of the tentacles, as well as to changes in the pigment spots. When examined in somewhat more advanced stages, Fig. 29, from the lower side, we still have the pigment spots prominent and well marked; the only change consists in the lengthening of the tentacles and the dorsal cirri, which are both fringed on their anterior edge by vibratile cilia.

disappeared except four prominent eye-specks, the same umber as found in the adult, in which, however, they are far ss conspicuous than in this stage of the young.

When the young worm has already thirty-five rings, there have been no changes of any consequence besides the further engthening of the dorsal cirri and the increase of the rudimentary cirrus at their base, which can first be traced in Fig. 29; two small tentacles have been formed at the anterior part of the head, Fig. 31. The number of bristles of the fifth ring has increased to five, and the number of glands in each enveope to eight or ten. In nearly full-grown specimens, when een from below, these glands are particularly prominent, Fig. 32, as well as the six hook-shaped bristles at the base of the hort cirrus. The black pigment dots have all disappeared, and the worm is gradually assuming a darker tinge, the fifth ing has increased in width, the larger of its bristles assuming he shape they have in the adult, as in Fig. 37, with a slight notch at their swollen exterior extremity. The simple hookhaped bristles of the seventh and succeeding rings, have developed a slight process on the convex side, with a stiff bristle, Fig. 38, extending from the base of the curve, as in the adult Polydora. The anal ring has taken a somewhat funnel shaped form, with which the little worms can attach themselves quite firmly; the adult makes use of this anal disk, Fig. 34, almost as freely as the sucking disk of a leech.

In the adult, Fig. 33, the dorsal cirri equal in length the hickness of the body, and have lost their vibratile fringe; the glands have taken a great development, consisting of no less han from thirty to forty comma-shaped bags, packed closely ogether within one envelope, as in Fig. 36. The digestive cavity has undergone slight changes, the œsophagus has remained as in previous stages, but we have a short intestine into which the long stomach empties. When seen from above, the head is pointed; seen in profile, it projects in a quadrangular lap, and shows the rudimentary tentacles formed at the base of the larger ones, Fig. 35. The eyes are small, four in number; the fifth ring has nine stiff bristles in different stages of growth; their number, however, is not limited, as we always find small ones growing even in the oldest specimens. Their use seems to be, as far as I can ascertain, to assist the worm in retreating into its case when disturbed.

The adult worms are found between high and low water-mark, about half tide; they abound in places where there is a mixture of sand and mud, building their cases upright, in large colonies, closely crowded together. The younger stages (Figs. 26–28) were always caught in great numbers with the dip-net, the more advanced stages being raised from them in captivity. Their growth is very rapid, as in less than six weeks they pass from the stage of Fig. 28 to Fig. 32.

The species here described is probably the same as the Polydora found by Claparède on the coast of Scotland; it is not the species called *Polydora cornuta* by Bosc, which occurs plentifully in sand and mud flats on Sullivan's Island in the harbor of Charleston, S. C. The South Carolina species differs from its northern representative by the length of its head, its short ance, they spread fan-like in every direction, roll themselves up in a ball like a hedge-hog, and become quite motionless, but soon start off again on their rapid gyrations, performed by means of an exceedingly powerful circle of vibratile cilia surrounding the head. The body at this early stage consists of seven distinct rings, and faint indications of a couple more in front of the anal ring, also surrounded by strong vibratile cilia. The dorsal cirri are slight swellings, and at the base of each we find two brushes of permanent bristles, the one composed of serrated, file-like, rough bristles (Fig. 42^a), similar to those observed by Claparède in an unknown Annelid larva,* the other, of smooth setæ, like those of the adult, placed immediately at the base of the rudimentary dorsal cirrus. The œsophagus and stomach are separated by a slight constriction; the younger stages (Fig. 39) have no pigment cells, and are moderately transparent; there are six eyes, the two larger ones, placed nearer the sides of the body, soon disappearing.

In subsequent stages the body lengthens and becomes more pointed; pigment spots appear near the head, extending towards the anal ring; they resemble those of Polydora, pass through the same stages, and before they disappear, have lost their beautiful star-shaped form, making a double row of more or less rectangular spots as in Fig. 40. The changes have been principally in proportions, the tentacles have slightly developed, the large anterior brush of serrated bristles losing its prominence. The dorsal cirri, as well as the tentacles, now develop rapidly, the powerful circle of vibratile cilia round the head having nearly disappeared, Fig. 41. We find in some of the rings of the anterior part of the body the first appearance of the clusters of stiff, hook-shaped bristles, like those of Fig. 44, found with the lower brush of smooth bristles in the adult; the eyes are four in number, quite small, the pigment spots have disappeared, as well as the anterior brush of temporary bristles. The little worm now enters a stage when it rapidly assumes the appearance of the adult. The number of rings increases rapidly, the dorsal cirri as well as the tentacles lengthen materially, the stomach proper becomes much narrower, and towards the anal extremity a distinct intestine (Fig. 42) has been formed. In a stage preceding, Fig. 40, it has many characteristics of the larva figured by Busch, on Plate VIII. Figs. 1–2 of his Beobachtungen. The serrated bristles of these young worms are not lost, as in other Annelids, where the ringed bristles are always temporary, but remain to form in the adult a brush of long bristles on the posterior side of the dorsal cirri, see Fig. 43; with the lower bunch of smooth setæ we find the row of hook-shaped bristles first noticed in Fig. 41; in Fig. 42 we have already from five to six of these bristles at the anterior rings. The upper brush of serrated bristles is found in specimens measuring no less than four inches in length, not raised in confinement, but collected on the beach, where they are found in company with Polydora, but by no means so commonly. Along the middle of each ring, on the dorsal side of the younger stages, Figs. 39, 40, we find a row of short vibratile cilia; similar rows, less numerous, of larger cilia, occur on the lower side. The anal ring terminates in the species of Nerine here investigated is probably the *Nerine coniocephala* of Johnston.[*]

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* CLAPARÈDE A. R. E. Beobachtungen. . . . Pl. VI., Fig. 6.

PHYLLODOCE MACULATA *Oersted.*[†]

Max Müller is thus far the only one who has observed larvæ of Phyllodoce;[‡] from his description they must have been in a condition nearly identical with the oldest larvæ here represented, Fig. 52. The youngest stages, Figs. 46–47, have a slight resemblance to the larvæ of Polynoe, figured by Sars,[§] Max Müller,[‖] and Claparède.[¶] We find in these earlier stages a very powerful ring of vibratile cilia extending round the middle of the anterior part of the animal, but no trace of cilia round the anal extremity. There are two very prominent eyes placed near the anterior extremity, and two quite rudimentary tentacles. There is as yet no exterior communication from the digestive cavity, which is simply blocked out, occupying little more than two-thirds of the space in front of the vibratile ring and of the large shield extending behind it; when seen in profile, Fig. 47, upper fig., the cavity is somewhat retort-shaped, and occupies mainly the dorsal portion of the embryo. Immediately behind the shield, Fig. 46, we find the small, conical body, where we can already trace the first indications of the broad paddles of Phyllodoce, as delicate transverse swellings on each side, connected by slight articulating lines. The articulations are tolerably distinct when seen in profile, Fig. 47, upper fig.; from this point of view the embryo appears far from cylindrical, the head is quite rectangular, with rounded corners, and nearly as large as the rest of the embryo. The shield bulges out nearly to the anal extremity, where it suddenly terminates, and leaves exposed the small rings preceding the anal ring; this terminal ring has not the prominence so characteristic of other Annelid embryos. On the lower side, immediately behind the vibratile ring, we find a slight swelling towards which the digestive cavity points, and where the mouth eventually is formed, Fig. 50, while the rudimentary paddles of the rings are plainly visible along the sides. The motion of these larvæ, as can be readily imagined from the size of the cilia, is exceedingly rapid, and though occasionally at rest for a short time, their gyrations are most unfortunate for careful observations.

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[*] Mag. Zool. and Bot. 1838. II. Pl. II. Figs. 9–13, p. 70.

[†] OERSTED A. S. Grönlands Annulata dorsibranchiata. 1848. Pl. III. Fig. 46, p. 39.

[‡] MÜLLER MAX. Note on p. 17; in Archiv f. Anat. u. Phys. 1855.

[§] SARS M. Zur Entwickelung der Anneliden; in Archiv f. Nat. 1845. I. p. 11. Pl. I. Fig. 12.

[‖] MÜLLER MAX. Ueber dei Entwickelung u. Metamorphose der Polynoen; in Archiv f. Anat. u. Phys. 1851. p. 223. Pl. XIII.

[¶] CLAPARÈDE A. R. E. Beobachtungen.... Pl. VIII. Figs. 7–8.

In subsequent stages we find that the posterior part, as in nearly all young Annelids, undergoes the greatest changes. The head has retained its shape, and its appendages have not enlarged; the shield and the body have both lengthened, Fig. 47, lower fig. The rings of the young worm are quite distinct, the broad flap (the future paddle) is more prominent; small cirri are developed, from which push out a single rather stiff bristle, and s yet no trace of a division into œsophagus, stomach, and stine; the main cavity still extends from the eye-specks trends towards the anal opening, gradually diminishing in . The chord of vibratile cilia have lost none of their er, and it is quite remarkable how long these embryonic ures remain, even after the generic characters have become l developed, and how early we can distinguish the family which our larva belongs. This is even more remarkable in ynoe, where before the young has more than six rings, it is ady a complete picture of the adult; the same is the case oung of Nereidæ described by Milne Edwards* and Clapa- e,† the young worm, of not more than four rings, possessing ady all the generic features of the adult.

hese young larvæ prosper readily in confinement; they w rapidly, passing in about ten days from the stage of Fig. to that of Fig. 50. Subsequently the increase is somewhat ver, and it requires about four weeks longer to find the ng Phyllodoce so far advanced that we can unmistakably r it to its proper species. In the next stage, Fig. 51, the d and shield commence to lose the prominence they for- ly held, the two large tentacles lengthen considerably, and additional ones are formed on each side, thus making eight g tentacles on the two sides of the now small rounded ld; the anterior tentacles become also somewhat more minent, as well as the lateral cirri from which project the tles, each bundle being composed of four or five, besides aciculum. In a somewhat more advanced stage, Fig. 52, ing twenty-five rings, we find the anal cirri slightly gthened, the broad lateral flappers are very distinct, the ll lateral cirri assuming nearly the shape they retain in the lt. The head has also become shortened, the two pairs anterior antennæ are equally developed, and the shield is reduced to a small circular patch. The changes henceforth are limited to the head, to the increase of the broad flappers and anal cirri, and to the different degrees of development of the antennæ, placed, in the stage of Fig. 52, directly one behind the other, although at the outset they originate one beneath the other; there is no trace to be seen of the rings corresponding to these antennæ, as we should expect theoretically. They lose little by little the ring of vibratile cilia, the head elongates, the eyes are brought nearer the base of the antennæ, until finally the anterior part of the little Phyllodoce has the shape of Fig. 53, and the broad flappers resemble Fig. 54, while the anal cirri have nearly assumed the shape of Fig. 55.

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* Edwards H. Milne; in Ann. Scienc. Nat. 1845. III. p. 167. Pl. 10, 57.

† Claparède A. R. E. Beobachtungen. . . . Pl. XII.

From the earliest stages the larva is never very transparent; it is distinctly tinged with brown, becoming darker with advancing age, till in the stage of Fig. 52, marked spots, darker than the main color, appear on the median line, which gives these young Annelids such an unmistakable resemblance to an adult Phyllodoce well known to me, and which I had always identified as *Phyllodoce maculata* OERST., that I scarcely needed

Claparède has fully demonstrated that neither the classifications of Busch, Müller, nor Schlutze, will satisfy the facts thus far observed, and it seems probable that Claparède's classification must share the same fate; we should only remember that all these attempts are based upon such few and incomplete observations that we cannot expect them to apply to subsequent discoveries. The features used by Claparède to make his subdivisions seem somewhat objectionable, as it would be impossible, unless the complete development of the larva were known, to ascertain to which of his divisions they belong; and yet these characters are, as far as the development of Annelids is now known, the best that have been proposed. The presence of temporary bristles is a good criterion for one division, and appears to be connected with fundamental differences in the larvæ, though the other division, based upon their absence, is liable to the usual objections of characteristics derived from negative features alone. How much more remains to be done before any such classification of the Annelid larvæ can be attempted with the least chance of success, is best shown by examining in any tabular view the number of families of which we know nothing as yet of their embryonic conditions. And though Krohn, Max Müller, Van Beneden, Wagener, Schneider, Keferstein, Pagenstecher, and others, but more especially Claparède, have lately done so much to advance our knowledge of the development of Annelids since the time of the first papers by Lovén, Sars, Milne Edwards, Quatrefages, and Müller, we can hardly be said to have more than commenced the investigations of the development of the Annelids proper, which in this respect are far behind the intestinal worms, and we must wait for further observations before classifications of embryonic Annelids can be of material advantage for systematic studies.

Among the young Annelids not yet traced to their adult condition, I would figure two forms totally unlike any hitherto described. They both come in the group of Metachætæ of

Claparède; and though I cannot refer them to their minor subdivisions, they already show most remarkable features. One of them (Fig. 56) reminds us somewhat of Polydora on account of the shape of its head and tentacles; it has, however, already a distinct œsophagus, stomach, and intestine, and not the slightest trace of bristles along the sides of the distinctly articulate body. We find on the anterior extremity on each side immediately behind the tentacles, an immense cluster of long smooth setæ, seven to eight in each pencil, nearly twice as long as the young worm. The posterior ring is edged with vibratile cilia, and terminates in a club-shaped appendage; the eyes are distinct, two in number. This little worm ($\frac{1}{50}$ of an inch in length) I have frequently fished up throughout the summer with the dip-net, but unfortunately always in the same stage. We have perhaps here again a case similar to that of Lovén's larva, described above, of a young worm, having articulations and well developed appendages, which has reached a condition when in other Annelids the temporary bristles have vanished, the permanent ones replacing them, and in which we find as yet nothing to tell us to what genus our larva may belong. Were I to less numerous and eventually be lost, as in the adult Nemerteans.

Another young worm, equally striking, is represented in Figure 58; it is a parasitic Annelid, attached by its posterior extremity to the underside of the carapace of lobsters, measures about $\frac{1}{30}$ of an inch in length, and consists of numerous rings; the mouth is edged by a series of small hooks. On the two sides of the anterior part we find three large temporary (?) articulate bristles, four or five times as long as the width of the body, the middle bristle is the longest; next come eight rings without appendages of any sort, the succeeding three rings are each provided with a long bristle, similar to those of the anterior extremity. These are the only appendages of the Annelid, the numerous rings of the body being bare; the anal extremity is somewhat club-shaped. The digestive cavity was not as yet subdivided into separate regions, and nothing in this young worm, in spite of the great number of rings, indicated even the family to which it might belong.

Although the embryological data at our command will not suffice in guiding us to any valuable systematic conclusions, yet the presence of temporary bristles of huge size in the young of so many Annelids is a feature of the greatest interest from a paleontological point of view. We find repeated in Annelids the same striking coincidence between certain features only embryonic in the present types, and which were characters of the adults in past geological times. I was particularly struck with this coincidence when examining a series of drawings of fossil Annelids kindly shown me by Mr. O. C. Marsh, of New Haven, which were all provided with bunches or single bristles of these large rough setæ, entirely out of proportion to the width of the body, and similar to those found in the embryonic Annelids we have noticed. The nature of the setæ and bristles, and their order of appearance in the types we have thus far examined, seem the only characters capable of general application of any systematic value; when a greater number of Annelids have been studied, the dorsal cirri, as well as the characters of the tentacles of the anterior part of the body, will furnish us valuable additional guides for classification in relation to the rank of families and genera; and as far as we can make use of them they seem to coincide remarkably with the generally received notions of superiority and inferiority of the principal families, current among the most accurate investigators of Annelids.

EXPLANATION OF LETTERING AND FIGURES.

v. anterior vibratile ring.
v'. anal vibratile ring.
m. mouth.
e. eye specks.
o. œsophagus.

s. stomach.
c. intestine.

t. tentacles.
y. concretion capsules.
a. anus.
r_5. 5th ring in Polydora.
r. first ring, the rings are counted from here.
g. glands of Polydora.

Fig. 7. Stage in which the anterior disk is diminishing in size and becoming slightly elongated; seen from the dorsal side.

Fig. 8. Head of Nareda in stage of figure 7; seen from the mouth side.

Fig. 9. Older stage than figure 8; the rings are further apart, the pigment spots larger, the head has become greatly elongated, and the tentacles are more prominent; seen from the dorsal side.

Fig. 10. Older than figure 9, the pigment spots have become quite small, and the vibratile rings are much reduced; seen from the dorsal side.

Fig. 11. Somewhat more advanced than figure 10, the anterior disk has lost its prominence, the vibratile cilia have nearly disappeared, the stomach has become convoluted, the pigment cells are scarcely perceptible, and the articulations quite indistinct; seen in profile, very sluggish in its movements, about one-fourth of an inch long.

Fig. 12. Head of specimen slightly older than figure 11; seen in profile.

Fig. 13. The same seen from the dorsal side; the tentacles are contracting.

Fig. 14. Young Nareda, which has lost almost all trace of the tentacles of the head, about half an inch long.

Fig. 15. Head of a somewhat older specimen.

Fig. 16. The same as figure 15; seen in profile.

Fig. 17. The head of a Nareda which has become less wide than the body; about five months older than figure 4.

Fig. 18. Portion of string of eggs of SPIRORBIS.

Fig. 19. Young TEREBELLA FULGIDA Ag., showing the order of development of the tentacles t_1, t_2; and the concretionary lime capsules *y*, greatly magnified.

Fig. 19a. Stiff bristles of the rings; magnified.

Fig. 20. Young Spirorbis soon after its escape from the egg, having only one tentacle developed on the right, t_1.

Fig. 21. Somewhat more advanced than the preceding figure, showing first trace of opercular tentacle.

Fig. 22. Young Spirorbis having three pairs of bristles, somewhat older than the preceding stage.

Fig. 23. The anterior extremity of a specimen more advanced than fig. 22, showing the first trace of bifurcation of the tentacles.

Fig. 24. Anterior extremity of a still older specimen, in which the contrast between the opercular tentacle (t_0) and the others (t_1—t_4) becomes very marked.

Fig. 25. Young Spirorbis, in which all the characters of the adult can be readily recognised. Lettering as above.

Fig. 26. Young POLYDORA having already lost the temporary bristles of the anterior rings.

Fig. 27. Somewhat older than the preceding figure, the pigment spots of the anterior part are more marked (from below).

Fig. 28. Older than figure 27, the dorsal cirri are quite apparent.

Fig. 29. Young Polydora, seen from below, the pigment cells are more concentrated than in the preceding stages.

Fig. 30. Somewhat more advanced, seen from the dorsal side, the pigment spots are reduced to mere dots, the number of rings has not increased from the preceding stage.

Fig. 31. Head of Polydora having forty rings.

Fig. 32. Anterior of young Polydora, not quite full grown, from below.

Fig. 33. Adult Polydora seen from above.

Fig. 34. Profile view of anal extremity of Polydora.

Fig. 35. Profile view of the anterior extremity of Polydora.

Fig. 44. Hook-shaped stiff bristles of the lower side.

Fig. 45. Posterior extremity of Nerine.

Fig. 46. Young Phyllodoce from the dorsal side.

Fig. 47. (u. f.) Figure 46 seen in profile.

Fig. 47. (l. f.) The tentacles of the anterior part of the Phyllodoce have developed. The body has considerably lengthened; seen from the dorsal side.

Fig. 49. The same seen from the mouth side.

Fig. 50. Young Phyllodoce, seen in profile in stage of Fig. 47. (l. f.)

Fig. 51. Somewhat older than the preceding stages; seen from above.

Fig. 52. Young Phyllodoce in which the body has greatly elongated; seen from above.

Fig. 53. Head of adult Phyllodoce maculata, from above.

Fig. 54. Paddle and setæ of adult of figure 53; seen in profile.

Fig. 55. Anal extremity of the same.

Fig. 56. Embryo Annelid, with immense bunches of temporary bristles.

Fig. 57. Adult of figure 56. ? ?

Fig. 58. Minute Annelid parasitic on shell of lobster.

INDEX.

PAGE
Planaria, ... 306
Lovén's Larva, ... 309
Spirorbis Spirillum, ... 318
Terebella Fulgida, ... 320
Polydora, ... 323
Nerine, ... 330
Phyllodoce Maculata, ... 333
Types of Development, ... 336
Explanation of Figures, ... 340

XXXV.—*Characters of seven New Species of Birds from Central and South America, with a Note on* THAUMATIAS CHIONURUS, *Gould.*

BY GEO. N. LAWRENCE.

Read June 25, 1866.

1. **Campylorhynchus brevipennis,** nov. sp.

Entire upper part of head blackish-brown, on the hind neck a few longitudinal stripes of pale rufous; back, wing coverts and tertiaries dark hair brown, with large whitish spots tinged with dilute rufous, on the back feathers and tertiaries the spots are roundish and in pairs, on the larger wing coverts there is a spot near the base of each feather, and another at the end running down the shaft; the larger quills are also dark brown with marginal oblong whitish spots; upper tail coverts dark brown, with pale bars of a dull rufous white; tail dark brown, the

Remarks.—The bill as well as the wings are proportionately short, the spots above are large and conspicuous, and below very obscure; it does not seem to require comparison with any other species.

2. **Automolus rufescens,** nov. sp.

Female. Upper plumage olivaceous tinged with cinnamon color, top of the head and hind neck rather darker; front, superciliary stripe, sides of the head, throat and upper part of the breast of a clear, rather light cinnamon, lower part of breast and abdomen paler, the latter, with the sides and under tail coverts duller, and having an olivaceous tinge; wing coverts, tertiaries, secondaries and outer margins of primaries, bright reddish-cinnamon, the inner webs of the primaries, except at their bases, blackish-brown; under wing coverts bright cinnamon, the inner webs of the primaries at base of a rather dull cinnamon; two central tail-feathers dull cinnamon slightly olivaceous, all the other tail-feathers reddish-cinnamon, a little lighter in color than the wings; the upper mandible brownish horn color, the edges and most of the under mandible whitish, the sides of the latter blackish at the base; tarsi and toes dark fleshy-brown.

Fourth quill longest, third and fifth nearly as long, second and sixth a little shorter and equal, first quill shortest.

Length (fresh) $7\frac{1}{2}$ in.; wing $3\frac{5}{8}$; tail $3\frac{1}{2}$; tarsi $\frac{7}{8}$; bill $\frac{11}{16}$.

Habitat. Costa Rica, Birris. From Dr. A von Frantzius, collected by José Paledon, May 15th, 1865.

Type in Mus. Smith. Inst., No. 39065.

3. **Grallaria gigantea,** nov. sp.

Hind part of crown and hind neck dark plumbeous, entire upper plumage besides rich olivaceous brown, front next the bill tinged with rufous; lores, sides of the head and under plumage dark rufous, the middle of the abdomen only paler, the sides of the neck and the whole of the under surface closely banded with black, the under tail coverts are also dark rufous, without bands but marked with a few minute black spots; tail dark chocolate brown; quills blackish-brown with olive-brown margins; under wing coverts rufous banded with black; upper mandible black, the under brownish horn color, lighter underneath and at the base; tarsi and toes dark fleshy brown.

Length of skin 9¼ in.; wing 6; tail 2¾; tarsi 2¾; middle toe and claw 1⅞; hind toe 9/16, its claw ⅝; bill from front (curve) 1½, high at base 11/16, wide 11/16.

Habitat. Ecuador.

Specimen in Mus. Smith. Inst., No. of type 35101.

Remarks.—This appears to be the largest of the genus yet discovered; the only species it at all resembles is *G. squamigera*, and that only in the transverse markings on the under plumage, but in the new species these bands are regular, more distinct, and extend over the entire under surface, whereas in *G. squamigera* the markings are almost confluent on the neck and upper part of the breast, gradually lessening in size and number, until on the abdomen there are none; the coloring of lores and circle around the eye rufous; ear coverts brownish rufous; a narrow semicircular band of black feathers extends in front of and under the eye; throat, breast, and sides of a rather dull orange rufous, somewhat dusky on the latter, on the breast and sides some of the feathers are marked with black marginal stripes; abdomen and under tail coverts whitish buff; the thighs brownish olive; upper mandible black, the under gamboge yellow; the rictal bristles are very long; irides brown; legs pale yellowish brown, claws whitish.

Length (fresh) $4\frac{1}{2}$ in.; alar extent $7\frac{3}{4}$; wing $2\frac{5}{8}$; tail $1\frac{1}{16}$; tarsi $\frac{13}{16}$; bill from front $\frac{1}{2}$, from rictus $\frac{3}{4}$.

Habitat. Costa Rica, Barranca. Collected by F. Carmiol, April 10th, 1865.

Specimen in Mus. Smith. Inst., No. of type, 41433.

Remarks.—This species is somewhat like *G. ferrugineipectus*, Scl., but that species appears to differ in having the throat white, the shoulders ochraceous, and to be without the black margins to the feathers of the breast.

5. **Phæthornis Cassinii**, nov. sp.

Female. Plumage above with the smaller and middle wing coverts of a rather dull reddish or coppery bronze, feathers of the crown darker, the coppery bronze on them deeper in color, and each feather with a terminal blackish margin; the upper tail coverts light rufous with blackish subterminal bars; the tail feathers are pale greenish olive at the base, succeeded by a broad black band, the four lateral feathers on each side are marked at their ends with reddish fulvous, the long ends of the central feathers are white; the larger wing coverts dark brown, the quills brownish purple; lores and ear coverts black; throat blackish-brown intermixed with dull fulvous, a stripe down the centre of the throat, one on each side of the neck from the corner of the mouth, and a superciliary stripe of fulvous; under plumage of a dull brownish-grey, the abdomen and under tail coverts tinged with fulvous; upper mandible black, the under yellow with the end dusky.

Length of skin 6 in.; wing $2\frac{1}{2}$; tail $2\frac{5}{8}$; bill $1\frac{3}{8}$.

Habitat. New Granada, Carthagena. Collected by Mr. A. Schott on the Atrato Expedition under Lieut. Michler.

No. 122 of Cassin's Catalogue of that collection. Spec. in Mus. Smith. Inst., No. of type 17918. Two specimens examined are neither in good condition, but they do not differ in plumage. One (No. 17918) from Turbo is marked as a male, but being in the poorest order, I have taken the one marked as a female for the type.

Remarks.—I have had these specimens in my possession for some time, and being unable to identify them with any known species, have concluded to characterize them as undescribed; they differ the most from all other species of this genus, in having the upper plumage reddish bronze without a trace of green.

I have named this species in compliment to my friend Mr. John Cassin.

6. **Eupherusa cupreiceps**, nov. sp.

Remarks.—In distribution of colors it resembles Mr. Gould's *Thaumatias chionurus*, but that species measures half an inch more in length, is without the coppery color above, has four green central tail feathers, and all the other tail feathers black at their ends.

It seems to me closely allied to *T. chionurus*, and both of them to *Eupherusa eximia* in the coloring of their under plumage, form of bills and tail feathers. I have therefore placed the present species provisionally in Eupherusa, and if not its true position, in my opinion, a new genus should be formed for this and *chionurus*, for to my eye they do not come so near any other genus as to Eupherusa.

NOTE ON THAUMATIAS CHIONURUS.—The bird I described as *Eupherusa niveicauda*, Ann. Lyc. N. Y., Vol. VIII., p. 134, I sent to Mr. Gould for the purpose of ascertaining whether it was his *T. chionurus*, and he has decided it to be that species. At the time of describing, it did not seem to me at all like a Thaumatias, which must be my excuse for naming it anew, and with due deference to Mr. Gould's opinion, it does not yet appear to me to be its proper position; the bill is differently shaped, as are also the tail feathers; these last are without the peculiar markings of Thaumatias, and the under plumage has none of the glittering character which prevails in that genus.

7. **Geotrygon Veraguensis**, nov. sp.

Fore part of the head as far as on a line with the eyes, and a stripe running from the corner of the mouth under the eye and to the hind neck, white with a slight rusty tinge; crown, hind part and sides of the neck, upper part of the back and the entire breast of a rich purple violet, crown a little bluish; the middle and lower part of the back, with the smaller wing coverts, are of a glossy greenish olive-brown; the middle and larger wing coverts, and the secondaries differ a little in color, being somewhat lighter, more of an umber brown; tail dull olivaceous dark brown, the ends lighter, with a broad subterminal band of blackish purple; primaries olive-brown with a greyish tinge, rather lighter than the tail in color; the shafts of the primaries and of the tail feathers at the base, are of a clear hazel-brown color; under wing coverts dark cinnamon, primaries at base and on inner margins pale dull cinnamon; throat light brown, tinged with violet; abdomen ochreous brown, becoming whitish below and on the flanks over the thighs; sides of a dull reddish brown, vent and under tail coverts lighter, more of a reddish ochreous color; bill black, the under mandible a little yellowish underneath; tarsi and toes yellow, the claws pale brown.

Length (specimen mounted) say about 9 in.; wing 5; tail $2\frac{7}{8}$; bill $\frac{11}{16}$; tarsi $1\frac{3}{8}$.

Habitat. Veragua. Collected by J. King Merritt, M.D.

Remarks.—I noticed this bird in the collection of my friend Dr. Merritt some years ago, but being mounted and in a case where it could not be seen satisfactorily, I intended to examine it again, but neglected doing so until quite recently, when at my request, Dr. M. kindly removed it from the case, and sent it to me for further investigation.

It seems entirely unlike any species of which I can find

XXXVI.—*Lepidopterological Contributions.*

BY AUG. R. GROTE AND COLEMAN T. ROBINSON.

Read September 24th, 1866.

Family ERYCINIDAE.

NYMPHIDIA, *Fab.*

Nymphidia borealis, n. s.

Upper surface, rich brownish ferruginous, covered and shaded by dusky scales, which leave merely the narrow terminal space (outside of the exterior metallic line) reddish ferruginous. Common, black, flexuous lines cross the wings basally; these lines are more or less continuous, but appear less macular than in N. pumila, *Bdv. and Lec.* The outer and most prominent of these lines is preceded by a broad, continued, black shade. Beyond, two exterior lead-colored metallic lines, as in N. pumila, but the outer line is straighter, and the inner appears more continuous, being less exserted at the centre of the wing and less lunulate, indistinctly margined by black scales; these metallic lines are both narrower than in N. pumila. The interspacial dots are large and prominent.

Under surface, bright orange yellow, of a rather deeper shade on the primaries; the black transverse lines are more interrupted. Compared with N. pumila, the inner metallic line is less disconnected and angulated. The metallic spots on the costa which precede this inner line and which, in N. pumila, are very distinct, are sub-obsolete in N. borealis.

Upper surface of the body, blackish, clothed with dusky scales; *under surface and legs*, fulvous yellow; *antennae*, resembling those of N. pumila, but longer, the club more prominent.

Expanse, 1.00 to 1.10 inches.

Habitat, New York State.

With a general resemblance to N. pumila, *Bdv. and Lec.*, this species is much larger, and is readily distinguished by the obscure color of the upper surface, and the detailed differences in the appearance of the metallic lines. The external margin of the primaries is straighter, less roundedly exserted than in N. pumila, with the angles more prominent. Owing to the obscure color of the upper surface of the wings in N. borealis, the contrast between the coloring of the upper and under surfaces is much more striking than in N. pumila.

Taken on the 5th of July, 1864, by Mr. Grote, near Upper Coldenham, Orange co., N. Y., about nine miles west of Newburgh, on the Hudson. Several (eight or ten) specimens were taken in the midst of a wood, while flitting over a mound free from undergrowth and exposed to the rays of the sun. These specimens have been partially distributed among collections in Canada (Saunders) and Massachusetts (Treat), under the name of N. pumila; but, since a number of Southern specimens have been received, a comparison of those remaining in our possession shows the specific distinctness of our northern species. So far as known to us this is the most northern habitat yet given for the genus, and it is worthy of note, that the spe-

The manner in which the Phalaenid genus Heliomata, *G. & R.*, with a similar geographical distribution, mimics the ornamentation of Nymphidia, is worthy of notice.

Family SPHINGIDAE.

When studying the position of the European Sphinx convolvuli, *Linn.*, and Sphinx ligustri, *Linn.*, with regard to the American species of Macrosila and Sphinx, we are led to consider the former species as belonging to the genus Macrosila, *Boisd.* (emend. *Grote*). Indeed Macrosila convolvuli exhibits the main structural features shared by our American species of Macrosila, a genus of which M. rustica may be considered typical, and which contains a number of species of similar habitus and robust development. Dr. Clemens has shown that, in their maxillary development, M. Carolina, M. 5-maculata, and M. cingulata, agree with M. rustica. Following the arrangement of the species in our recently published "Synonymical Catalogue," M. convolvuli falls in very naturally after our North American M. cingulata, a species which has been occasionally mistaken by earlier authors as identical with its European congener. While we thus consider the European M. convolvuli, the lowest and most degradational specific form of Macrosila, we concede, on the other hand, that the European Sphinx convolvuli, *Linn.*, is the highest or typical form of Linnæus' genus Sphinx, as now received. Thus the course of Hübner, in separating the two European species generically, is justified, and Lethia, *Hübner*, becomes synonymous with Sphinx, *Linn.* While borrowing a brighter tint from a higher genus, S. ligustri is structurally identical with the North American S. chersis (*Lethia chersis*, Hüb., *Sphinx cinerea*, Harris), S. drupiferarum, S. kalmiae, etc.

In this view a somewhat different arrangement of certain genera belonging to the tribe *Sphingini* suggests itself. We would inaugurate this tribe with Ceratomia, *Harris*, a genus which, in its reduced thoracic and cephalic parts and its soft coloration, suggests affinities with the *Smerinthini*, a resemblance which is heightened by its antennal structure and that of its labial palpi. The species hitherto so often mistaken for Drury's S. brontes, and which we believe was first described by Dr. Clemens as Ceratomia rerpentinus, here follows naturally. We have proposed to retain the name Daremma, *Walk.*, for this species, but the use of this generic name is not free from objection. The genera:—Syzygia, *G. & R.* (afflicta); Diludia, *G. & R.* (jasminearum, *G & R.*, (*Sphinx jasmin.* Bd.) brontes, florestan, collaris); Pseudosphinx, *Burm.* (tetrio); Amphonyx, *Poey* (antaeus, duponchel, hydaspes); Macrosila, *Boisd.* (rustica, ochus, aper, carolina, 5-maculata, cingulata convolvuli); Sphinx, *Linn.* (ligustri, chersis, drupiferarum, kalmiae, etc.)—then follow, and form what seems to us, with our present material, the most natural arrangement of the genera.

Objection having been made to the etymology of the generic name Erinnyis, *Hübner* (1816), we find that, independent of the propriety of avoiding any change in its form as written by Hübner, there is a valid Hesperiid genus erected by Schrank

Dilophonota, *Burmeister* (1856).
Erinnyis, Hübner (1816).
Anceryx, p. Boisd., Ms. (1856).

I.

Stout species, characterized by the elevated, square thoracic parts, which are but slightly advanced before the insertion of the primaries:

1, D. rimosa! (*Erinnyis rimosa*, Grote.)
2, D. congratulans, *Gundlach*, in litt.!
3, D. caricae, *Burm.!* (*Sphinx caricae*, Linn., *Sphinx cacus*, Cramer., *Diloph. cacus*, Burm. (Mexico!)

II.

External margin of anterior wings entire; a single slender species with, otherwise, much the habitus of the species belonging to Group 3:

4, D. caicus, *Burm.!* (*Sphinx caicus*, Cramer.)

III.

External margin of anterior wings evenly and slightly dentate; the more typical group of the genus:

5, D. ello, *Burm.!* (*Sphinx ello*, Linn.)
6, D. alope, *Burm.!* (*Sphinx alope*, Drury.)
7, D. merianae! (*Erinnyis mer.*, Grote.)
8, D. oenotrus, *Burm.!* (*Sphinx oenot.*, Cramer.)
9, D. melancholica! (*Erinnyis mel*, Grote.)
10, D. cinerosa! (*Erinnyis cin.*, Grote.)
11, D. pallida! (*Erinnyis pal.*, Grote.)
12, D. obscura (*Sphinx obscura*, Fab.)
13, D. stheno (*Erinnyis stheno*, Hüb.)
14, D. guttularis! (*Anceryx gut.*, Walk.)

Of these species but two are not certainly known to us. As

D. obscura, we would regard a small species, rarely found in the Atlantic States, which, compared with D. pallida from Cuba, is a smaller, slighter, and darker species. These specimens differ from Hübner's figure of Erinnyis stheno quite strongly, so that we are not disposed to record Hübner's species as synonymous with D. obscura for the present, although so cited by Mr. Walker in the British Museum Lists. We have lately received specimens of D. caricae from Mexico, so that this species may be included in our catalogue. Dr. Gundlach has confided to Mr. Grote a MS. species under the specific name, *congratulans*, and which has been described under that name by Mr. Grote as Erinnyis congratulans, *Gundlach.* The name is here changed to Dilophonota congratulans, *Gundlach*, under the authority given by its discoverer to Mr. Grote.

Tribe *Choerocampini.*

CHOEROCAMPA, *Duponchel.*

middle, becoming obsolete immediately before the margin. This linear band is angulated prominently immediately below costa and thence obsoletely so on the nervules, with faint traces of connexion by dark scales. An even, dark olivaceous line from apex to internal margin at without the middle, everywhere distinct. This line is followed by a faint pale olivaceous shade, defined outwardly irregularly by aggregations of the black irrorations, which are here more prominent than elsewhere, and stretch along internal margin to the angle. Below the costa, on the apical interspace, is a faint ochreous shade. Terminally, the wing is somewhat darker than elsewhere, forming a defined terminal space, traversed centrally by a sub-obsolete series of black dots on the nervules, faintly connected by an obsolete dark shade line. Secondaries, black; an irregular median band of pale, obscure whitish, or olivaceous whitish scales, forming triangulate spots, discontinued before costa, and prominently divided, centrally, by three very black streaks formed by the scales covering the median nervules. All the margins pale. A rather wide terminal band along internal margin, paler but similarly colored with primaries above.

Under surface of primaries, bright ochreous, distinctly irrorate with black dots. Basally, over the lower part of the disc and beyond, over the nervules at base and at the centre, the wing is shaded with dull blackish scales. A prominent, inwardly oblique, blackish band, obsoletely angulated on the nervules and excavate between them, borders inferiorly the blackish basal shade and runs very distinctly from costa to third median nervule, thence obsoletely, merged in the blackish shade, to internal margin. A subterminal series of black dots on the nervules, the dot at costa the largest, inferiorly becoming obsolete. Terminal space darker and narrower than on the upper surface, but similarly colored and neatly defined. Secondaries resemble primaries in coloration, but without any blackish shades, becoming paler along internal margin and basally, crossed by two sinuate series of black nervular dots corresponding to those on the primaries; the inner series being connected by a pale blackish shade line excavate between the nervules.

Head, thorax, legs, and abdomen, resembling upper surface of primaries in coloration, irrorate with black scales. Centrally, the

prothorax above is shaded with dark olivaceous and brownish, which darker shades extend over the patagia inwardly. No defined lateral discolorous linear shade. Abdomen, above, shaded with blackish and with large, diffuse, lateral, segmentary, blackish maculations, obsolete centrally.

Expanse (♀) 4.20 inches. Length of body, 2.20 in.

Habitat—Mexico (Mirador).

Belongs, with the following species, to the second N. A. Group of the genus, containing C. nechus, C. porcus, etc., and resembles distantly C. anubus, *Cramer sp.* from Surinam. It resembles the description of C. nitidula, *Clemens*, but differs in detail. There are no lateral caputal and thoracic linear discolorations, nor an abdominal "double row of dark brown dots." No mention is made in the description of C. nitidula, of the very distinct irrorations which characterize C. laevis, in which latter species the very distinct black angulate oblique linear band, emanating from costa at apical fourth, is a prominent feature; the presence of this band in C. nitidula, is denied by the italicized expression "a *single* brownish line from the with fused, inwardly oblique, very sinuate, dark brown lines running from costa to internal margin. Along the costa, terminally, and on the nervures, the wing is coarsely sprinkled with black irrorations. Centrally, and rather constrictedly, the wing is bright, rather pale, brown. This color extends along the costa to about apical fourth, where it is limited externally by the extremely oblique exterior dark brown lines, and forms a deep sinus extending downwards over the discal cell to internal margin, which latter, however, it does not attain, leaving the extreme edge blackish. A black discal dot on the discal cross-vein, situate at the point of origin of the first median nervule. The exterior dark brown lines, on a slightly paler ground, are for the most part even, very oblique, and beautifully, while sometimes dissimilarly, curved and angulated. The first, and most prominent of these lines, which margins the brown central space, emanates from a blackish irregular costal blotch which extends over the base of the apical interspace, and runs obsoletely and straightly to sub-costo post-apical nervule, where it forms an angle, whence it runs, slightly sinuously and very obliquely, inwardly to internal margin at about basal third. This is closely followed by five similar lines, the first of which is continuous and abruptly angulate on fourth median nervule. The succeeding lines become obsolete at about second median nervule, but are again apparent on fourth median, and, with the second exterior line, again angulate on internal nervure. All these lines are obsolete, more or less, on apical interspace, which latter is covered with paler, more ochraceous or testaceous scales than elsewhere, and shows the coarse black irrorations very plainly. The fourth exterior line is most distinct after and before its central interruption. The fifth, more irregular and darker line, emanates from extreme apex, and is followed by a broad irrorate ochreous shade running from second median nervule to the internal margin, and extending narrowly outwardly to the angle. Where the third, fourth, and fifth exterior lines become obsolete, they assume the ground color which obtains between them at the base and between the first and second lines throughout their length—a paler duller brown, and are narrowly separated and brought into relief by ochraceous scales. Terminally, the wing is shaded with pale olivaceous brown; a dark olivaceous terminal shade band along external margin, prominently interrupted at the nervules by paler, somewhat ochraceous scales.

Posterior wings, bluntly produced at apices, which are rounded and hardly prominent. Blackish; at base, on internal margin, an obscure whitish aggregation of longer scales, and a second similar below the discal cell, further removed towards the middle of the wing. An irregular, pale, ochraceous shade band, coarsely irrorate, interrupted inferiorly and spreading over anal angle. Terminally, the wing is blackish; along external margin an obscure, irrorate, dark olivaceous ochraceous shade band, prominently interrupted at the nervules; fringes paler, especially before anal angle.

Under surface of anterior wings, dull brownish black; terminal space paler, strigose. Apex and apical interspace, pale testaceous ochraceous, below which the interspaces are stained with reddish and covered with coarse irrorations. Here the exterior transverse lines of the upper surface are vaguely indicated, with similar ochraceous lateral shades towards the internal margin. Secondaries, resembling primaries in color; costa, at base, ochraceous, coarsely irrorate; on internal margin, at base, a pale whitish patch, corresponding to that on the upper surface, but continuing, deepening in color and coarsely irrorate, to below the discal cell. An irregular

Habitat.—Mexico (Mirador).

A beautiful species, the ornamentation and coloration of the primaries recalling that of the very different Ceratomia amyntor *Hübner* sp. (*C. quadricornis*, Harris), a resemblance which has suggested the specific name.

Family THYRIDAE.

PLATYTHYRIS, n. g.

Antennae, rather long, slender, filiform, naked. Head, sunken, improminent, impressed on the prothorax; palpi large, obliquely ascending, held free from the front; eyes, globose, small; vertex, narrow; the supra-caputal squamation is rough; epicranium, concealed. Prothorax, wide, square in front and short, not projected in front of the insertion of the wings as in Thyris. Thorax subquadrate, densely and closely scaled; abdomen, stout, of equal width, not constricted basally, as long as, but hardly exceeding the secondaries; anal segment constricted. Wings, wide; primaries more than half as wide as long; apices obtusely rounded; external margin entire, slightly sinuate, being outwardly rounded before internal angle; internal margin straight, equalling the costal margin in length, the external margin being hardly oblique. Secondaries, wide and full, nearly as large as the primaries, external margin very sinuate. Legs, stout, thickly fringed with strong hair.

This coarsely scaled genus with broad wings, differs from Thyris in the entirety of its corporal structure, so as to render any neurational comparisons unnecessary to support its validity. Compared with Thyris, the thoracic parts are less compact and much less advanced before the insertion of the wings, giving the insect a noctuid appearance, which its strictly filiform, rather long and slender antennae, full, short abdomen, and wide secondaries tend to exaggerate. The opposed characters give to Thyris its strongest resemblance to the Aegerians. Thyris vitrina, *Boisd.*, Mon. Zyg. 6, 19, pl. 1, fig. 5, belongs to this genus.

Platythyris fasciata, n. s.

(Plate 18, figs. 4, ♀, 5, ♂ [reverse].)

Dull cupreous brown. Anterior wings with three approximate, wide, diffuse, transverse basal bands, composed of obscure yellow scales, speckled with and separated by brown scales of a brighter hue than the ground color of the wings. The first of these bands covers the extreme base of the wing and is so diffuse as to lose its vittate character. All of these bands are brighter and more distinctly marked on costa; the third, which crosses the disc, is most evident. Impinging on the outer margin of the third band is a small, sub-triangulate, vitreous spot on the disc. Beyond, the dull brown color of the wing obtains, appearing as a regular band tapering to internal margin. Beyond this are two terminal bands similar to the basal ones but darker, more brownish, and more distinctly defined and separated. The first of these, or the subterminal band, is contiguous to the second or external band, which latter lies directly on the margin. Secondaries, resembling primaries in appearance and coloration. The yellowish bands of the margin, becoming fainter in color towards the internal angle, and with an irregularly sinuate inner border.

Caputal and thoracic parts above, dull brown with a yellowish bronzed reflection, the latter more prominent on the thorax. Abdomen paler brown, shaded at base with yellowish scales, as also at the anus above and beneath. Legs densely fringed and, with the under thoracic parts, of a pale obscure olivaceous brown. The sexes resemble each other, the male being a little the darker.

Expanse, ♂ and ♀ 0.80 inch. Length of body, 0.35 inch.

Habitat.—Virginia.

This species differs from Boisduval's figure and description of Thyris vitrina, in the color of the brighter scales of the wings, which is here plainly yellow and bronze, whereas they are stated in the former instance to be red or reddish ("rouge"—"rouge rutilant"). There are no basal marks or bands on the upper surface in P. vitrina, in which the brighter markings are limited to two composite external maculations, unlike the well defined bands which characterize P. fasciata. The descriptions of the under surface differ throughout, while the two species are plainly congenerical.

Thyris maculata, *Harris*, our common species from the Atlantic District, is closely allied to, and strictly congenerical with the European Thyris fenestrella, *Scop.* sp. It differs by its somewhat smaller size, and by the single vitreous spot of the primaries, which, in T. fenestrella, is larger and distinctly geminate. The two species are representative.

Platythyris vitrina, is sometimes included by writers on European Lepidoptera, as belonging to the European fauna, but oftener omitted. Dr. Boisduval states his specimens to have come from Andalusia (Spain) and the United States; he also gives a description of the larva of P. vitrina, from a drawing received from Georgia; probably this drawing is one of Abbot's, and hitherto unpublished. The species, however, has not been since rediscovered here, and, as a simple theory, it may not be hazarding too much if we conjecture that the specimens from which Dr. Boisduval drew up his description and executed his figure of Thyris vitrina, were in reality European, and that Abbot's supposed drawing, as well as any authentic United States' specimens which Dr. Boisduval may have possessed, belong to Platythyris fasciata, *nob.*, which, while apparently very amply distinct, may be considered as representing the European P. vitrina, in America. As is the case with Thyris, our genus would then be represented on both continents.

The elimination of Platythyris, draws our attention to the plasticity of thoracic structure in the group to which, together with Thyris, *Illiger*, this genus belongs, and which group it may not be improper to consider as a Family—Thyridae—until instituted comparisons shall have indicated its fusion with one or the other already acknowledged and extensive families with which it shows assimilative characters. The highest genus—Thyris—imitates very plainly the higher Aegeriidae (*Sesiidae*) in its thoracic characters; on the other hand, the lowest genus—Platythyris—resembles, in the structure of the same parts, the lower Zygaenidae, especially the inferior Castniid the other, and which appears to us to afford no trace of that Bombycid feature which, in the Zygaenidae, owes its presence to analogy.

With regard, finally, to Thyris lugubris, *Boisd.*, with which we are autoptically unacquainted, and which Dr. Harris states to have received from Florida, it would seem, if correctly referred here, to form the type of a distinct genus. Should it really belong to the Thyridae, it will be highly interesting as typical of a genus still lower than Platythyris, and affording, to judge from the figure, analogical resemblance with the lower Zygaenid genus Syntomis, and with a number of other valid genera hitherto loosely arranged under the old name "*Glaucopis*," and which are now referred to a sub-family of the Zygaenidae. The Florida species would thus complete a series of mimetic forms which, while illustrating other family rank, are degradational in so far as we fail to perceive cohesive characters, or such as shall be purely those of a distinct family type.

FAM. ZYGAENIDAE.

SUB-FAM. ZYGAENINAE, *Pack.*

Charidea, *Dalman.*

Charidea bivulnera, n. s.

(Plate 13, Fig. 2, ♂)

Size, moderate; anterior wings, black; apices narrowly fringed with white scales; costa depressed basally, arcuated before the apex. Extreme base and internal margin, for three-quarters of its length from the base, covered with brilliant pale blue scintillate scales; these form a rather broad and prominent band on the internal margin. A large scarlet basal patch, sub-triangulate in shape, extends from just beyond extreme base to about the middle of the wing, leaving the costa narrowly black and margining straightly the scintillate band on internal margin. Externally, this patch terminates irregularly, forming a superior point, below which is a moderate excavation. An oval scarlet spot rests subterminally on the median nervules; above this is a small patch of pale blue scintillate scales divided centrally obliquely by the black scales which cover the sub-costal nervure. Fringes black, except at extreme apices.

Under surface of anterior wings resembling upper, but the blue scintillate scales encroach on and cover the basal scarlet patch inferiorly, also obtaining beyond it, and between it and the terminal scarlet oval spot. The sub-costal scintillate patch is also larger.

Posterior wings, black, with a brilliant dark blue shade, which latter obtains principally at the base and along internal margin, extending thence outwardly towards the middle and external margin. Under surface, resembling upper, but almost entirely covered with paler blue scintillate scales of a variable shade.

"Front," bright metallic blue. Palpi exceeding, and held horizontally free from the front; above, dull blackish; beneath, bright metallic blue. Antennae black, evenly pectinate; the caputal surface between them at base is covered with black scales; behind, with metallic blue scales. Thorax, above, dull blackish, overlaid with bright blue metallic scales on the "collar," extending laterally to the insertion of the wings, on the patagia inwardly, and on the from that species in the conformation of the scarlet patches on the primaries, while no mention is made in Mr. Walker's description of the subcostal metallic scales, or of the white thoracic patch beneath, extending inwardly on the anterior femora, which are prominent characters in the species we have just described.

FAM. BOMBYCIDAE.

SUB-FAM. ARCTIIDAE.

Arctia, Schrank.

Arctia mexicana, n. s.

(Plate 13, Fig. 8, ♂)

Size, moderate; anterior wings, black, with broad, very pale yellow bands; a broad, yellowish longitudinal band, narrowest at the base, runs beneath the median nervure from extreme base of the wing to internal angle, and is obsoletely furcate at the margin. First transverse band (at basal third) irregular, being broadest at costa, narrowing to the central longitudinal stripe, where it is slightly angulated, and beneath which it is most constricted, widening irregularly to internal margin. A median, slightly flexuous, similarly colored band, of everywhere nearly equal width. Very approximate to and beyond the median band, is a third, slightly more flexuous, and which, with accessory bands which issue from it, forms a figure resembling the letter K, with the straight stroke turned towards the base of the wing, and the upper limb, attaining external margin, reflexed to costa before the apex; the lower limb resting on the extremity of the central longitudinal stripe at external margin. Costal edge, entirely pale yellow, nowhere encroached upon by black scales. External and internal margins narrowly bordered and fringed with pale yellow scales. Under surface reflecting the ornamentation of upper surface, and resembling it in coloration; the costal edge is shaded with brighter, somewhat orange-colored scales.

Posterior wings, testaceous, yellowish, with a terminal series of blackish irregular spots, and abbreviated bands along the costa and external margin. Internal margin, clothed with longer, pinkish or pale crimson hair. Under surface, resembling upper, with the black abbreviated costal bands more prominent.

Head and "collar," yellowish, immaculate; the former with a brighter tinge on the vertex and front; palpi, blackish; antennae, rather short, bi-pectinate; thorax and patagia, black, prominently fringed with yellowish hair, so as to give the appearance of three broad dorsal black stripes. The caputal and thoracic parts are loosely clothed with long hair. Abdomen, above, clothed with long pinkish or pale crimson scales, concolorous with those on the internal margin of the secondaries, but rather darker. A central, dorsal, narrow, blackish stripe, or series of close maculations. Beneath, dark brownish, which latter color obtains over the anal segments above; centrally, on the basal segments, is a distinct yellowish scale patch. Legs and under thoracic surface, dark brownish; anterior legs with pale orange-colored scales between them at base; immediately below the head and laterally, the scales are black or blackish.

Expanse.— ♂, 1.25 inch; length of body, 0.65 inch.

Habitat.—Mexico. (Mr. W. H. Edwards.) "No. 25."

decorata, *Saunders*, is a form of Arctia nais, *Walker*, with red secondaries, Drury's figure having these yellowish. We have received a second male specimen of A. mexicana, *nob.*, from a different locality in Mexico. This specimen merely differs from the type, by its slightly greater expanse (1.35 inch.), and in that the black terminate marks and spots on the secondaries are, for the most part, wanting; this is a natural variation of the species of this genus. From A. phalerata, *Harris*, the Mexican species may be quickly distinguished by its red abdomen. In A. mexicana, the costae of both pair of wings are tinged with ochreous yellow beneath.

ECPANTHERIA, *Hübner*.

Ecpantheria leucarctioides, n. s.

(Plate 14, figs 3, ♀ 4, ♀.)

Female. Primaries, white, crossed by six irregular dull blackish macular bands faintly bordered by yellowish tinges. First (basal) band consisting of three spots; that on costa being largest, subquadrate; the third, on internal margin, greatly reduced. Second (extra-basal) band consisting of five spots, angulated on the disc. Third (median) band, broad and prominent, consisting of black sub quadrate patches, narrowly and neatly separated by the nervules, which are covered with pale, yellowish white scales; two or three smaller spots clustered at the base of the interspaces beyond the discal cell. Fourth (extra discal) band composed of eight reduced, narrow black spots, sinuate, flexuous. Fifth (sub-terminal) band, resembling third but broader, composed of black, interspacial, even patches, obsoletely and incompletely separated by the yellowish white nervular scales; the black patch on the interspace between the second and third median nervules is much reduced, the fourth band intruding at the place. The sixth (terminal) band is composed of irregular, triangular, black, interspacial patches resting on the extreme margin of the wing, and partially connected; that on the interspace between the third and fourth sub-nervules is reduced to a small dot; that on the interspace above internal nervure is large, obliquely sub-quadrate and fused above with the fifth band, giving the latter the appearance of being furcate at internal angle. Secondaries, wholly blackish, with an obsolete cyaneous tinge; a terminal, ochre yellow, irregular band, more or less interrupted; costal and discal irregular ochre yellow flecks and spots; costal "veins" obsoletely covered with yellow scales; anal angle imperceptibly produced. Under surface of primaries, washed with pale ochre yellow, paler on costa and along external margin, and reflecting the macular ornamentation of the upper surface. Under surface of secondaries resembling upper.

Head and thorax, white; "front" wholly colored with cyaneous, blackish scales; antennae dark cyaneous; behind, the head is white, immaculate. Prothorax, white, with two approximate, supra-lateral, blackish spots; tegulae, white, with two large inferior black spots; two, smaller, on the thoracic disc, which elsewhere is white. Metathorax, white, with a single, large, central, rounded blackish spot. Abdomen, black, with an obscure subcyaneous tinge; all the segments bordered narrowly with ochre yellow, the yellow scales fused towards the abdominal base, thus forming incomplete lateral stripes, which are again apparent at the anus. Beneath, the same as above, the narrow yellow seg-

Antennae, simple, blackish; oral organs, head, prothorax, thorax and tegulae as in the female. Seven thoracic black spots, approximate, supra-lateral on the prothorax; one at the extremity of each tegula; two, between these last, on the thoracic disc, and one centrally on the metathorax. Abdomen, largely ochre yellow; a dorsal series of blackish and sub-cyaneous spots, and, on each side, a lateral segmentary series of black dots; beneath, entirely white, except some blackish scales before the anus; anal segment largely black above. Legs, for the most part, whitish; tarsi, blackish, as are the anterior coxae.

Expanse, 1.60 inch. Length of body, 0.75 inch.

Habitat.—Mexico (Mirador).

This highly interesting species is beautifully illustrative of the affinity between the whitish closely and finely scaled Arctian genera, such as Eupseudosoma, *Grote*, Leucarctia, *Packard*, and Ecpantheria, *Hübner*, to which latter genus, E. leucarctioides, structurally belongs. It is especially remarkable in simulating the coloration, and in some degree the ornamentation, of Dr. Packard's genus Leucarctia. The yellow abdomen of the male, which is however more entirely so than in L. acraea, *Packard*, and the yellowish secondaries, are points of more than casual resemblance. The usual annulations of Ecpantheria, are here perfect maculations; an additional approximation to Leucarctia, while, conversely, it is the female E. leucarctioides, *G. & R.*, in which the under surface of the primaries is tinged with ochre yellow of a but little lighter shade than that of the male Leucarctia acraea. There is a great uniformity in the caputal and thoracic coloration and ornamentation, which leads us to unite the two individuals, without question, as sexes of one species; otherwise the differences are great, while still such as we could expect, judging from analogous instances. The main disposition of the macular bands on the primaries is identical in either sex, while their expression is modified. Again, these sexual differences, abstractedly, forcibly recall to us our United States L. acraea, with its prominent colorational sexual divergence, which led its first discoverer to describe the sexes under different specific names. To the accustomed secondary sexual characters of Ecpantheria, are added, in the instance of E. leucarctioides, an expression of those of Leucarctia. The secondary sexual characters are here, however, most strongly expressed by a difference in color and size; in the Castniid genus Euscirrhopterus, *Grote*, or, still better, the Psychid genus Psychonoctua, *Grote*, the structure of the sexes is so dissimilar, or, in other words, the secondary sexual characters are so strong, that we are driven to combine the sexes on superficial instead of particular characters, which latter, however, future investigation may disclose. In Heliocheilus, a Heliothid genus from Colorado Territory, we have another striking instance of the degradation of the neuration into secondary sexual character. Indeed we shall find that any attempt to classify the Lepidoptera throughout, by means of characteristics drawn from a single structural feature, for instance, the antennae or the neuration of the wing, will be attended by failure; for we shall be apt to see the character

Habitat.—Pennsylvania.

In the form of the body, cut of the abdomen, this species resembles L. scapha, *Harris;* but the corporal parts are much slenderer and the wings proportionally more elongated. In one specimen the wings are diffusedly shaded with pale cinereous. There is a slight and variable depression on external margin, below the apex, on the primaries. The general coloration resembles that of the secondaries of L. scapha, but of a paler and warmer tint. The utter absence of any markings sufficiently characterizes this species in separating it from its congeners.

The generic name, Cyrtosia, employed by Dr. Packard for a genus belonging to this sub-family, having been previously used in Diptera, it becomes necessary to propose a new name for the lepidopterous genus. Under the circumstances it seems appropriate to dedicate it to its discoverer, and we accordingly propose for it the name Packardia. The species are as follows: Packardia elegans (*Cyrtosia elegans*, Packard, Proc. Ent. Soc. Phil., p. 342, October, 1864); P. fusca (*Cyrtosia fusca*, Packard, l. c.); P. geminata (*Cyrtosia geminata*, Packard, l. c.); P. albipunctata (*Cyrtosia albipunctata*, Packard, l. c.); and P. ocellata (*Cyrtosia ocellata*, Grote, Proc. Ent. Soc. Phil., p. 322, April, 1865, plate 2, fig. 2).

SUB-FAM. PTILODONTES.

LOPHODONTA, *Packard.*

On Plate 78 of the work on the Insects of Georgia, Abbot gives two figures as the sexes of a moth which receives (p. 165, l. c.) the name of Phalæna angulosa, *Smith.* In reality these are distinct species, as our material proves. Under the name of "*Notodonta Georgica*," Herrich-Schaeffer figures the female of Abbot's male, P. angulosa, *Smith*, and it seems proper to retain this specific name. We have a ♀ specimen perfectly corresponding with Herrich-Schaeffer's figure and both sexes of

P. angulosa, *Smith*, (♀ *) before us. Our species, then, will be as follows:

LOPHODONTA GEORGICA.

Phalaena angulosa, Smith, Ins. Ga., plate 78, ♂ (upper left-hand figure) (1797).

Notodonta georgica, Herrich-Schaeffer, Exot. Lep. fig. 384, ♀, (1855).

LOPHODONTA ANGULOSA, *Packard*.

Phalaena angulosa, Smith, Ins. Ga., plate 78, ♀ (?) (lower right-hand figure) (1797).

Lophodonta angulosa, Packard, Proc. Ent. Soc. Phil., Vol. 3, p. 358, (Nov. 1864).

SUB-FAM. PSYCHIDAE.

PSYCHOCAMPA, nov. gen.

♂. Head, sunken; clypeus, broad; labial palpi, approximate, much reduced, not extending as far as the "front," concealed amid internal margin short and straight, a little more than half as long as the costal edge. Posterior wings, reduced, roundedly sub-quadrate; anal angle bluntly exserted. All the nervules long and straight, or but slightly curved. The m. nervure of the primaries throws out four m. nervules; of these the second and third are thrown off together from one point before the discal cross vein which closes the cell; the fourth well removed from the third; a sub-median fold. The costal nervure of the secondaries is basally arched.

The position of this genus is intermediate between Oeceticus, *Guilding*, and Lacosoma, *Grote*. It possesses close structural affinities with Lacosoma, resembling this genus also in coloration and in the style of squamation. The analogies of Psychocampa are with the Ceratocampidae, and, when we compare the genus with Anisota, *Hübner*, (*Dryocampa*, Harris), these become quite striking, so that at first sight we should be inclined to refer it in the immediate vicinity of Hübner's genus, before weighing the characters and separating those which are of analogy from those which are of affinity. It is evident, that those that are more clearly superficial, are those that would decide the position of Psychocampa among the Ceratocampidae. And, indeed, those characters which would influence this latter reference, *i. e.* the shape of the wings and the close squamation, are shared in a hardly different, but somewhat less exaggerated degree, by certain other Psychid genera heretofore alluded to. It is the exaggeration of these correspondencies that renders Psychocampa interesting as an intermimetic form.

Psychocampa concolor, n. s.

(Plate 14, fig. 5, ♂.)

Entirely dull olivaceous brown, with a slight cupreous reflection. There are faint traces on the primaries of a blackish inner line and median discoloration, and of a common outer line crossing both pair on the upper surface, and which is roundedly angulated on primaries below costa. Body and corporal parts concolorous with the wings. Female unknown.

Expanse, ♂, 1.80 inch. Length of body, 0.75 inch.

Habitat.—Para (Brazil). Coll. Mrs. S. W. Bridgham.

SUBFAM. CERATOCAMPIDAE.

Tribe HEMILEUCINI.

Hemileuca, *Walker.*

This name is proposed by Mr. Walker (Cat. Lep. Het. B. M., Part 6, p. 1317, 1855), for a genus of which the *Phalæna-Bombyx Maia*, of Drury, is the type. The *Saturnia eglanterina*, of Boisduval, is also included, but unauthoritatively so—Mr. Walker being evidently autoptically unacquainted with the Californian species. As we shall show, S. eglanterina is generically distinct from Hemileuca maia, and is properly made the type of a distinct genus. In 1864, Dr. Packard, in his "Synopsis," proposes the generic name "*Euchronia*" for Mr. Walker's Hemileuca maia, and uses the name "*Hemi-*

PSEUDOHAZIS, n. gen.

The body is comparatively slender, and shortly and sparsely scaled. Head, small; clypeus, narrow, evenly and rather densely covered with short squamation. Eyes, improminently small or sunken. Antennae, rather long, with broad, dependent pectinations, which are strongly setose. The antennal insertion is brought more forward than in Hemileuca. Thorax, slender and narrow, shortly and sparsely scaled. Legs, short and slight, finely scaled and feebly armed. Wings, ample, rather long, evenly and closely covered with short scales. Nervules, long and straight. Compared with Hemileuca, in which the median nervules are short, arched, and are thrown off from beyond the middle of the wing, the difference in the course and length of the discal nervules is very palpable. On the primaries the 2d m. nervule is thrown off before the discal cross vein; the 3d shortly follows, nearer to the base of the wing, and all three median nervules are longer, and go more straightly to the external margin of the wing. The same is true of the median nervules of the secondaries, where, also, the course of the sub-costal nervules is opposed to that in Hemileuca. In the present genus, the s. c. nervules run straightly to the external margin, whereas in Hemileuca they are bent upwards, and are shorter, the first s. c. being prominently arched to the apex of the secondaries. The hind wings are more rounded and less ovate in Hemileuca.

The habitual coloration exhibits a resemblance to that of the genus Hazis, *Boisd.*, and has suggested the generic name. The species are yellowish and black, with a common extra mesial band and discal blotches on both wings.

Our species are Pseudohazis eglanterina (*Saturnia eglanterina*, Boisd., *Telea eglanterina*, H—S. Lep. Exot. 445) from California, and Pseudohazis hera (*Saturnia Hera*, Harris), from the Rocky Mountains.

The North American genera, belonging to the tribe *Hemileucini*, are as follows: Hemileuca, *Walk.*, (maia); Pseudohazis, *G. & R.*, (eglanterina, hera); Coloradia, *Blake*, (pandora); Hyperchiria, *Hübner*, (varia, and other Mexican species); and Dirphia, *Hübner*, (tarquinius). From this latter genus several species from tropical America and Mexico, referred here by Mr. Walker, remain to be separated, as we are satisfied from the study of material kindly communicated by Mr. W. H. Edwards. We place this tribe at the head of the sub-family. In this position it forms a natural transition from the *Attaci* (the typical Bombycidae) to the *Dryocampini;* and the genera present a series of distinguishing structural features compared with either of those groups. Thus, while the ♀ antennae are, as a rule, less heavily pectinated among the Attaci, than these organs in the ♂, we have them still less so, serrate, or nearly simple in the Hemileucini, and becoming demi-pectinate or simple in the Dryocampini. Again, the ♂ antennae are gradually reduced in the Hemileucini, and become demi-pectinate in the Dryocampini. The lower genera of the present tribe have the external margin of the primaries straight, and the apices acute; thus simulated by Eacles, with which genus we would inaugurate the succeeding tribe. In the Attaci, and in these two lower tribes of Ceratocampidae, Platysamia, *Grote*, (cecropia, columbia, californica)—all have a peculiarity of habit in the position of the wings when at rest, which had been already observed by Linnæus.

In the Hemileucini we have the wings still full, while no longer so large; but, in the Dryocampini, we have a subordination of the secondaries, both as to ornamentation and to size, which is prophetic of a lower type, less perceivable in the highest genus—Eacles, but evident in Citheronia, Adelocephala, and Anisota, which latter genus, by its small-sized species and their degraded form, prepares us for Tolype and Gastropacha, genera belonging to a lower sub-family type of the same family—the Bombycidae.

TRIBE, DRYOCAMPINI.*

Genus, CITHERONIA, Hübner.

The species belonging to Citheronia seem to us, as yet, insufficiently separated, and there exist certain errors in the synonymy which we endeavor to correct in our present notice of the genus. Both Citheronia and Eacles, are erected by Hübner in the "Verzeichniss;" the types of the genera being respectively the *Bombyx regalis* and *Bombyx imperialis* of Fabricius. In 1855, Mr. Walker confounds the two genera in the British Museum Lists, Lep. Part VI., pp. 1370–1376. Eacles imperialis, Drury, sp., is properly cited there by Mr. Walker, but Citheronia regalis, *Fabr.* sp., is described erroneously as *Eacles Laocoon*, Cram. sp. Cramer's *Phalæna Bombyx Laocoon*, Exot. Vol. II., Plate 117, Figs. A–C, is cited as illustrating our Northern species; but a comparison of specimens with the Plate shows, that Cramer's is a distinct species, though likewise belonging to the genus Citheronia. An enumeration of the many distinguishing features is unnecessary, the more so as, in the description which is here given of a new Mexican species of the genus, the habitual characters of the species are fully discussed. To continue, no reference is made by Mr. Walker to Drury's figure in the Exotic Entomology, Vol. III., Plate 3, Fig. 1, given in illustration of Cramer's species, *Phal. Laocoon*, as appears in the Index, though in the description (p. 4), Drury states it to be a new or nondescript species. This determination is, however, manifestly incorrect. On the contrary, Drury's figure well represents Phal. Phoappears to be the correct synonymy of the species of Citheronia, so far as known to us, unless others, as is not unlikely, are included under *Eacles* by Mr. Walker, and erroneously regarded as congeneric with Eacles imperialis, *Hübner*, and Eacles magnifica, *Walker*.

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* We take for this Tribe a name derived from Dr. Harris's generic name Dryocampa; the species included under this generic name had been previously associated by Hübner under Anisota, which latter appellation must accordingly be retained for the genus. Vide Grote, Proc. Ent. Soc., Phila., p. 93, June, 1864, and Packard, Proc. Ent. Soc. Phila., p. 384, Nov., 1864; also, a paper entitled: "Description of a new species of Citheronia, and Remarks on Anisota rubicunda," by ourselves in the same Proceedings, April, 1865. The North American genera composing this tribe, are Eacles, *Hübner*; Citheronia, *Hübner*; Adelocephala, *Boisduval* (remarkable for having the antennae pectinate in both sexes); and Anisota, *Hübner*. These genera are naturally brought together through their metamorphic and imaginal characters. The "Family *Communiformes*," Hübner, Verz., contains certain of the genera; this name is quite expressive of the habitus.

For remarks on the classificatory position of the Tribe, see Grote, Proc. Ent. Soc., Phil., p. 37, August, 1865; also, for description of a new Mexican *Adelocephala*, id. scrip., p. 7, May, 1866.

CITHERONIA REGALIS, *Hübner*.

(Plate 12, Fig. 1, ♂.)

Phalæna Laocoon, Stoll (nec. Cramer), Suppl. Cram. Pap. Exot., Part V., pp. 179–180, Plate 42, Fig. 2 ♂ (1791).

Bombyx regalis, Fabricius, Ent. Syst., Vol. III., p. 436, No. 93 (♂ teste Smith), (1793.)

Phalæna regia, Smith, Nat. Hist. Ins. Ga., Vol. II., p. 121, Plate 61, ♀ (1797).

Citheronia regia (*regalis*), Hübner, Verz. Schm. p. 153, No. 1599 (1816).

Ceratocampa regalis, Harris, Cat. Ins. Mass., p. 72 (1835).

Ceratocampa regalis, Harris, Rep. Ins. Mass., p. 287 (1841).

Dryocampa regalis, Duncan, Nat. Libr., Vol. XXXII., p. 161, Plate 18 (1845).

Eacles Laocoon, Walker (descrip. imag.), Cat. B. Mus. Lep., Part VI., p. 1372 (1855).

Ceratocampa regalis, Morris, Syn. Lep. N. Am., Smith. Ins., p. 229 (1862).

Ceratocampa regalis, Harris, Rep. Ins., Mass., New (3d) Ed., p. 399, Figs. 194–195 (1862).

Citheronia regalis, Packard, Proc. Ent. Soc., Phila., Vol. III., p. 381 (Nov. 1864).

Habitat.—Atlantic District! (Mass. to Ga.)

Of not uncommon occurrence, especially at the South.

CITHERONIA SEPULCRALIS, *Grote and Robinson.*

(Plate 12, Figs. 2–3, ♂.)

Citheronia sepulcralis, Grote and Robinson, Proc. Ent. Soc., Phila., Vol. IV., p. 222, ♂ (April, 1865).

Habitat.—Atlantic District! (Mass. to Ga.) Rare.

We are informed that this very distinct species has been figured by Abbot on an unpublished Plate belonging to the work on the Lepidoptera of Georgia.

The larva of C. sepulcralis, has been frequently taken by Mr. James O. Treat upon the common Yellow Pine, in the vicinity of Lawrence, Massachusetts. Its discoverer writes, that he finds it "difficult to rear, as most are ichneumonized, probably on account of the poor protection afforded them from their enemies by the scanty foliage of this Pine."

We have alcoholic specimens of this larva, which, while sharing the same generic characters with that of C. regalis, is quite distinct. Compared with alcoholic specimens of this latter species in their last moult, the larva of C. sepulcralis is or spread laterally into the dark interspaces. Two irregular pale yellow blotches at extreme base. On the discal cell a large reddish yellow blotch, intersected longitudinally by the terminate furcation of the central reddish orange discal stripe. Beyond the disc, a series of reduced interspacial reddish yellow blotches, which is quite sinuous, being continued inferiorly, approximate to the median nervure, beneath the discal cell, and terminating in a more prominent and paler spot on the striped sub-median fold. A prominent sub-terminal series of yellow spots, conspicuously shaded on the edges with reddish orange scales. Of these, the two occupying the apical and post-apical interspaces are by far the largest and are sub-equal. The one immediately beneath them is much reduced, and that on the medio-superior interspace is still more so. That on the medio-central interspace is again larger, spherical, and similarly covered, being pale yellowish centrally, with a shaded edge of fulvous scales. On the two following interspaces the spots are smaller and darker; the sub-median fold dividing and quite separating the spot into two, whereof the lower is larger and the more irregular. Finally, the spot on the internal margin is spherical and well-sized, equalling that on the medio-central interspace, but slightly darker colored. A terminal very distinct and conspicuous orange yellow band is continued, approximate to the sub-terminal macular band, from costa to internal angle, the last inflection running outwardly from the sub-median fold to the extremity of the internal nervure. This terminal band is formed of disconnected spots in the first three superior interspaces, but, from the medio-superior interspace to the internal angle, it is continuous, becoming narrowed at its final inflection to the angle. On the medio-central and posterior interspaces, this band forms very prominent outward inflections. Beneath, the primaries are paler, being sparsely covered with shaded yellow and fulvous scales basally and centrally, while the markings of the upper surface are more faintly reproduced. Terminally, the dark lead color again prevails.

Posterior wings dull orange color, with a faint terminal, rather narrow, dark lead-colored shade, better defined near costal angle. A median dark shade band and a dark shade immediately beyond the discal cell, while the base of the wing is hardly darker, or more orange, than elsewhere. Beneath, yellowish, paler than upper surface; the median band is here more distinct, continued and orange-colored, while the extra discal shade forms a large orange-colored spot.

Body, orange. Thorax with lateral yellow stripes, which meet in front over the prothoracic parts. Abdomen, orange, with yellow bands on the segments anteriorly; beneath, yellow, with two central rows of orange spots and lateral stigmatal series of similarly colored spots; above, the anal segment is entirely orange-colored. Antennae, short, impectinate. Legs, orange-colored.

Expanse, ♀, 5.80 inch. Length of body, 2.00 inches.

Habitat.—Mexico. (Mr. W. H. Edwards.) "No. 1."

The differences between this species and the United States C. regalis, are as follows; the comparison will bring out the habitual ornamentation of the genus in detail. The general color is more purely orange and less red, especially on the upper abdominal surface and that of the secondaries. These latter are also paler and duller, more distinctly banded, and the yellow patches on the costa and internal margin, which chaing also the row of three light-colored interspacial dashes at about the middle of the internal margin. The veins in Cramer's figure are more broadly striped with dirty reddish on the upper surface of the primaries, and the terminal band is only indicated from the disco-central to medio-central interspaces, where it is not broadly waved as in C. mexicana. The very different male figured by Cramer is not what we should expect, as the opposite sex of the present species, which conforms in its habitus to C. regalis, and which we seem authorized to regard as representative of the latter in a more southern latitude. In Cramer's figure of the ♂ *Phal. Laoccon*, the terminal band is completely given, but, as in the female, quite narrowly; thus opposed to its development in C. mexicana, in which it is broad and prominent. The resemblance between C. regalis and C. mexicana consists rather in the abstract pattern of ornamentation proper to the genus, than in purely specific characters. Thus, while we select C. regalis, or what is much better, C. mexicana, as exhibiting the fullest development of its generic pattern of ornamentation, we have in C. sepulcralis, its most degradational aspect, and, having compared the species structurally as generically identical, we can agree upon the distinctive pattern of ornamentation which predicates the association of the species. We regard C. mexicana as replacing C. regalis in the entomological fauna of the Tropical Continental District.

CITHERONIA LAOCOON.

Phalæna-Attacus Laocoon, Cramer, Exot., Vol. II., p. 30, Plate 117, Figs. A–C, ♂ and ♀ (1779).

Citheronia Anassa, Hübner, Verzeichniss bek. Schm., p. 153, No. 1600 (1816).

Habitat.—South America (?), "Bengalen" (Cramer).

Apparently under the impression that the specific name chosen by Cramer for this species was preoccupied, as indeed it had been very confusedly used by authors, Hübner proposed a new name for it; the change is, however, hereby rendered unnecessary.

CITHERONIA PHORONEA, *Hübner.*

Phalæna-Attacus Phoronea, Cramer, Exot., Vol. III., pp. 77–78, Plate 239, Figs. A–C, ♂ and ♀ (1781).

Phalæna-Attacus Laocoon, Drury (nec. Cramer), Ill. Exot. Ent., Vol. III., pp. 3–4, Plate 3, Fig. 1, ♀ (1782).

Citheronia Phoronea, Hübner, Verz, bek. Schm., p. 153, No. 1601 (1816).

Cossus Laocoon, Westwood, Drury, Vol. III., p. 3, Plate 3, Fig. 1, ♀ (1837).

Eacles Phoronea, Walker, Cat. B. Mus. Lep., Part VI., p. 1375 (1855).

Habitat.—"Surinam" (Cramer); "Rio Janeiro" (Drury); "Brazil" (Walker).

C. phoronea appears to differ considerably from the other species than the Cuban A. impunctus, *Grote*, of a slightly smaller size, and has the thorax above punctate with black. This latter character has, then, been properly relied on, among others, to distinguish the continental from the insular species, since the Cuban A. impunctus, *Grote*, (♂ ♀) has the thoracic region above, and head impunctate, whereas Cramer's figure (♀) has these parts dotted with black. In the single (♂) Mexican specimen we have before us, the vertex is immaculate, there being no black mark between the eyes as represented in Cramer's figure.

XXXVII.—*Notes on the Natural History of the Scorpion.*

BY THE HON. RICHARD HILL, OF JAMAICA, W. I.

(COMMUNICATED BY T. BLAND.)

Read October 22, 1866.

IT is when a question is unexpectedly asked relative to objects we know familiarly, that we find we have taken for granted a multitude of circumstances which, when inquired into, are found to have been improperly stated, or imperfectly understood. I have been looking into the authority for things said respecting the parentage, and life, and habits of Scorpions, and I find them, when attentively considered, to be true in appearance—but in appearance only. I refer first to the assured fact that the young clinging to the mother-scorpion quit her only when they have exhausted her by living on that vital circulation we may call her blood, and leaving her dry and dead.

The known moult of the parent scorpion seems to explain the occurrence of the young being found on the dry integument that has been sloughed off. How often has the perfect case of a crab on the rocks been taken for the crustacean dead and dried up. It is the moulted casement, that the living creature has shrunk out of, which appears as the dead crab.

With regard to the scorpion the truth seems to be that during the month the young cling to the mother, they are, one after the other, devoured; that four only escape the predaceous parent or the devouring community of young ones, and go forth to perpetuate the species. More than four hundred scorpions, sent from Italy to Cuvier, in Paris, were reduced in a short time to a few individuals. Monsieur Leon Dufour, who has described the scorpion *roussâtre*—the Scorpio oceitanus—the scorpion de Souvignargues, on which Maupertuis tried experiments—a common scorpion of Spain—says he never met with two of them under the same shelter. They most usually live solitary, digging in the earth a round hole, where they lie down squatted. When they quit their retreat to seek food, it is at night or in the evening. They carry what they have caught, held fast in their pincers, with their tail straightened out behind, but when surprised with their load, they throw back their claws and then bend the tail over the body. The head being protected, the sting, essentially a movable weapon, is directed effectually any way, either for attack or defence. Having given this precise account of the scorpions, as he observed them casually and particularly, he says: "se battent same web till the first moulting, then separate, and stand aloof from one another, and become mutual enemies. Under some circumstances, Latreille tells us, some scorpions kill and eat their young as soon as they can prey on them, from time to time. Maupertuis having inclosed together the parent with a hundred young ones, found in a short time that they were reduced to fourteen.

Doctor Maccary, who has carefully detailed the history of the scorpion, while agreeing with the equally precise facts of Dufour, in representing the two broods of young to be in spring and autumn, only establishes that those are the breeding seasons, not that they produce two broods in the year. They take two years to engender, and go through near a year in gestation. Scorpions are comparatively rare.

"The scorpion girt with fire," stinging itself to death, is generally credited. Maupertuis has combated this opinion, but Monsieur Le Comte de Senneville, the Grand Referendary of the French Chamber of Peers, made trials of the fact in the presence of a great number of persons, and confirmed the popular opinion, "se pique lui-même et se donne ainsi la mort."

The fecundated germs of scorpions are placed in particular tubes, and pass from the matrix, when they have reached the period of extrusion. The young are disengaged while the eggs are in their place within the body, and they come forth full-formed from the mother. Monsieur Marcel de Serres carefully observed for a long time the European scorpion, and, though he found the number of eggs ordinarily to be twenty-five or thirty, yet he saw a female extrude forty-nine young ones. Leon Dufour, remarking that the ovigerous tubes of insects are conoid and polysperme, states that the bag (*bourse*) that contains the young is globulous and monospermal. The uterus has a form not to be seen but in the scorpion. The size of the fœtus is so disproportioned to the external opening, and the extrudant passage, from its horny consistence, is so little susceptible of dilatation, that this naturalist could not conceive how the young could be brought forth but under extraordinary effort. Leon Dufour, while conducting his researches into the gestation of scorpions in the summers of 1810 and 1811, meeting with two females of the roussâtre species, with abdomens widely distended, opened them and examined them, and found in the midst of eggs very near to maturity, a little scorpion, extra-uterine, and free in the abdominal cavity. It was three lines long by a line and a half broad. All its members were swathed together (emmaillottés), so that it could perform no movement. The tail was conformable in the number of its knots to that of the mother; it was turned in along the belly, and the sting was hidden by the feet, the claws being thrown back, and not apart from them (les palpes rejetés en arrière se confondoient avec elles). The two great smooth eyes, very near each other, shone like two big points. The infant scorpion then comes forth prepared for active life, yet it clings for a long month to the mother—sixty certainly, in some instances a hundred, holding on her, dependent for their insect food. "Les scorpions," M. Dufour has said, "se battent entre eux à outrance, et finissent par s'entre-devorer." During the moult the parent does in Arachnidans. A few days of fasting and sickness precede the moult. The loosening of the outer envelope from the under *corium* gradually ensues; the animal detached from all connexion with its old covering eventually makes its escape. The operation is announced by symptoms of inquietude. The creature throws itself on its back, shakes itself, puffs itself out, so as to separate the connecting membranes. These acts form intervals of rest and agitation. The head is extricated with the eyes; the extremities are freed with difficulty; it would be impossible to disengage them, did not the covering split longitudinally; but not unfrequently a limb is left in the sheath, and occasionally the animal perishes in the process. The tegumentary skeleton being sloughed off, all the parts resume their position, and the epidermal sheath represents the complete external form of the articulated creature that has inhabited it. The time occupied in the business of the moult in crustaceans varies according to atmospheric influences, but fasting and sickness accompany the act, and the new integument, from being soft and membranous, soon becomes hardened and colored to its proper tints. (Réaumur—Mémoires de l'Academie des Sciences. 1718.)

The alimentary canal of the scorpion is embedded in a fatty substance. This canal is exceedingly narrow, with only a partial dilatation of the digestive organs, such as is met with in insects, the natural consequence of the character of the scorpion's food, not entirely, though greatly, the animal juices sucked from the bodies of its victims. With little necessity for capacious receptacles for nutritious matter, there is equally as little occasion for reservoirs for effete materials. Absorption and nutrition conducted on, when a store of fat has been laid in, will allow of intervals of resting and fasting. Under inactivity, where fatty matter has been deposited, a process of consumption in repose, like that which takes place from the larva to the pupa state of the insects, will result. After a month the congregated young of the scorpion would be ravenous, and the first exhibition of their carnivorous instincts would be the carnage which would ensue after the mother's moult, with their consequent dispersion.

There are one or two known facts in the natural history of the scorpion that must not be overlooked in ascribing the destruction of the progeny to the parent, or to the ravenous appetite of the young preying one upon the other. In taking the insects on which it feeds, it seizes them with its pincers, and then it breaks them up into smashes, as I understand the words of Dufour, "qu'ils broient entièrement," and in this way feeds upon them by piecemeal. This would imply that we must look for that which was indigestible or that which would resist crushing. Wolkamer, in his experiments with scorpions and spiders when opposed to each other in fight, represents the scorpion as stinging its adversary to death, and then sucking the spider, after it had torn off all its legs. My own experience of a scorpion in a bottle, fed with cockroaches (Orthoptera, Blatta), would warrant me in saying they left nothing, in one or two instances, only the outer wing cases, the tegmina. The legs were all devoured, not sucked and then thrown away, as we clean the days brought forth their young in confinement, and permitted them to live, he saw them, each and all, change from a milk-white color to a rusty brown. He saw them fix themselves on the back and belly of the mother. They lived a fortnight together quietly and well, but after this they daily died. He does not say they disappeared. At the end of a month there were only two living young ones.

We want a variety of precise facts. We have ordinarily only casual occurrences noticed. We should have the patient investigations of months, and, if possible, of a whole year.

NOTE.—I submitted the foregoing paper to my friend Mr. Henry Krebs, of the Island of St. Thomas, W. I., a careful observer, who favored me with the following remarks. (T. B.)

1. The young of the scorpion are born at intervals. As seen on the mother's back they are of different sizes, which proves that they are not born simultaneously. The largest (oldest) ones are nearest to the head, and the smallest (youngest) to the tail of the mother.

2. The young change their integument at least once while living on the back of the mother, where I have repeatedly seen the "epidermal sheath" of the young.

3. It is very probable that the young leave the back of the mother as soon as they have for the first time changed their integument; at least I have found them, of the size they have attained at that period, living apart from her.

4. That the young kill and eat the mother is, I think, very doubtful. In my opinion they leave her back when she catches her prey and partake of it with her, after which they resume their place.

5. The West Indian scorpion leaves the wings, but devours the legs of the cockroach.

XXXVIII.—*Remarks on some Species of West Indian Marine Shells in the Cabinet of Amherst College, Mass.*

By Henry Krebs, of St. Thomas, W. I.

Read November 26, 1866.

(COMMUNICATED BY T. BLAND.)

(Mr. Krebs published in 1864, for private distribution, a Catalogue of the West Indian Marine Shells. With a view to the republication of the Catalogue, with additions and corrections, he lately visited Amherst College for the purpose of examining the specimens deposited in the Cabinet of that Institution by the late Professor C. B. Adams. The following are the notes of Mr. Krebs on them and their nomenclature. T. B.)

Calcar ramosus Meusch. Three specimens from Florida without name, and two marked "*turbinatus*," locality not given.

Calcar Spenglerianus Chem. Two small imperfect specimens from Jamaica, without name.

Cerithium bicolor C. B. Ad., is the *C. punctatum* L., of the

C. minimum Gmel. and *C. zonale* Brüg., perhaps also with *C. septemstriatum* Say, *C. ferrugineum* Say, *C. megasoma* C. B. Ad., and *C. nigrescens* Menke.

Cerithium vicinum C. B. Ad., and *C. rugulosum* C. B. Ad., we take to be synonymes.

Chemnitzia exilis C. B. Ad., *C. flavocincta* C. B. Ad., *C. laevis* C. B. Ad., and *C. subulata* C. B. Ad., are very like each other.

Chemnitzia multicostata C. B. Ad., and *C. substriata* C. B. Ad., may, when a sufficient number of specimens are at hand, prove to be synonymes.

Chemnitzia obeliscus C. B. Ad., is described from three pieces of different and very imperfect individuals.

Chemnitzia puncta C. B. Ad. (not *punctata*), is described from two miserable specimens.

One species from Jamaica, seven from St. Thomas, and three from the "West Indies" are without names.

Columbella catenata Sowb., and *C. subcostata* C. B. Ad. Specimens with these two names are positively the same species.

Columbella costulata C. B. Ad., described from a single specimen from Jamaica, we consider syn. with *C. obesa* C. B. Ad.

Columbella purpurascens C. B. Ad., is placed next to *C. dormitor* Sowb., and is the same species.

Conus aurantius Hwass., is in a box with and under the name of *C. leucostictus* Hwass.

Conus cretaceus Kien., from Jamaica, we take to be *C. pusio* Brüg., which we consider the young of *C. mindanus* Hwass.

Conus maculiferus ? Sowb., from Jamaica, appears to be the young of *C. leucostictus* Hwass.

Erato cypraeoides C. B. Ad. Numerous specimens from Jamaica.

Eulima arcuata C. B. Ad. We believe this is to be nothing more than a monstrosity.

Fusus muricoides C. B. Ad., is a *Ricinula.*

Fusus nitens C. B. Ad., described from a single Jamaica specimen, is not, perhaps, a *Fusus.*

Marginella albida C. B. Ad., and *M. nivea* C. B. Ad., belong to the same group as *M. apicina* Menke.

Marginella cincta Kien., is the *M. marginata* Born. of the collections at St. Thomas, and of Mr. R. Swift, of Philadelphia.

Marginella conoidalis Kien, is with "*M. nivea* Born," as synonyme.

Marginella fluctuata C. B. Ad., is very near *M. chrysomelina* Redf.

Marginella imbricata Hinds. The locality given is "Caribbean Sea."

Marginella interrupta Lam. The locality given is "Porto Cabello."

The two last are of one species, in separate boxes, with different names.

Mangelia candidissima C. B. Ad., is a white variety of *Pleurotoma badia* Reeve, of the collections at St. Thomas and of

Murex rarispina Lam. We think this is the same species as found at St. Croix by Professor A. S. Orsted, and now in the Cabinet of the University of Copenhagen under the name of *Murex Antillarum* Hinds.

Natica cancellata Lea, is the more smooth form of *N. rugosa* Chem., which we take to be syn. with *N. sulcata* Born., *N. rugosa* Gmel., and *N. costata* Menke.

Natica cancellata Lam., is the true *N. rugosa* Chem., which consequently would have five synonymes, if the names in the Amherst Cabinet be correct.

Neritina Jamaicensis C. B. Ad., is likely syn. with *N. chlorina* Link.

Neritina ornata C. B. Ad., is very like *N. virginea* L.

Odostomia canaliculata C. B. Ad., and *O. solida* C. B. Ad., are very like each other.

Pleurotoma albida C. B. Ad., and *P. fusiformis* C. B. Ad., appear to be synonymes.

Pleurotoma Augustae C. B. Ad., is *P. coccinata* Rv.

Pleurotoma minor C. B. Ad., is very like a *Columbella*.

Pleurotoma monilifera C. B. Ad., and *P. pygmaea* C. B. Ad., both from Jamaica, are *Columbella Broderipii* Sowb.

There are twenty without names.

Ricinula nodulosa C. B. Ad., is *R. ferruginosa* Rv.

Rissoa crassicosta C. B. Ad., one poor specimen from Jamaica, very like a *Scalaria crenata* L., is certainly not a *Rissoa*, but being placed next to the *Scalariae* a mistake may have arisen.

Rissoa minor C. B. Ad., *R. multicostata* C. B. Ad., *R. scalarella* C. B. Ad., and *R. scalaroides* C. B. Ad., are syn. with *Rissoina Catesbya* d'Orb.

Rissoa tervaricosa C. B. Ad., is syn. with *R. melanura* C. B. Ad., and *Eulima incerta* d'Orb.

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mentions having detected, among the Bahamas shells in the cabinet of Governor Rawson, two not very good specimens supposed to be of "the very rare *Murex spectrum*."—T. B.

Strombus alatus Gmel., and *S. pugilis* L. The specimens under these two names are of one species.

Strombus accipitrinus Mart. One specimen from Florida marked "scarce," is of the very common species from the Virgin Islands.

Strombus dubius Sowb., are young only of *S. pugilis* L.

Strombus inermis Sowb., is never found in the Virgin Islands. Mr. R. Swift directed attention to the differences between *S. accipitrinus*, the species from the Virgin Islands, and *S. inermis*, common at the Bahamas and on the Coast of Florida. Perhaps *S. Goliath* Chem. is a very old specimen of *S. inermis*.

Triton pulchellus C. B. Ad., is a young *T. chlorostomum* Lam.

Triton tesselatus Rv., is a species commonly found at Bermuda, St. Croix, and St. Thomas.

Trochus angulatus C. B. Ad., and *T. lividus* Phil., vide *Modulus*.

" *Turbo calcar?* L.," is *Astralium phoebia* Bolt.

Turritella bicingulata Lam. Six specimens from West

XXXIX.—*On the Classification of the* APHREDODERUS GIBBOSUS *Le Sueur;* SCOLOPSIS SAJANUS *J. Gilliams.*

BY THEO. A. TELLKAMPF, M.D.

Read November 5, 1866.

IN an article on the blind fish[*] (Amblyopsis) I made the following remarks: Whether the "Aphredoderus[†] and Amblyopsis are to be brought together in a new family, Heteropygii, remains to be decided. Prof. Joh. Müller is of the opinion, that it will depend upon the fact, whether the air-bladder of the Aphredoderus has an air-duct or not, for not one of the Acanthopterygii has such an organ. If the Aphredoderus has no air-duct it cannot be classified in the same family with the Amblyopsis; it would in that case be a Heteropygius among the Acanthopterygii, the only representative of a family analogous to that of which the Amblyopsis should be the only representative among the Malacopterygii; but if the Aphredoderus has an air-duct it is certain that both fish belong together. The family containing them would form a family by itself, which could be classified neither with the Acanthopterygii nor with the Malacopterygii abdominales."

In order to decide this question, I have carefully examined some specimens, some last year, some quite recently. In dissecting the cellular tissue, by which a portion of the air-bladder is attached to the œsophagus, I made use of lenses and of the microscope.

Although from the examination made last year, of some young specimens, which were for some time preserved in alcohol (with air-bladders collapsed), I was convinced that the air-bladder had no air-duct; still I considered it necessary, in order to remove all doubts on this subject, to establish the fact, that the air contained in the air-bladder, when completely detached from the œsophagus, does not escape on pressure.

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[*] J. Müller's Archiv, 1844, p. 387. Berlin.

[†] Classified by Cuvier and Valenciennes with the Percoidea. Hist. Nat. des Poissons, pp. 450–452.

By an examination of some fresh, almost full grown specimens, the air-bladders of which were well filled with air, I have been enabled to establish this fact. I have to observe, that the air-bladder cannot be isolated from the œsophagus, for the purpose I had in view, until a portion of the abdominal walls and of the gills has been removed.*

It is therefore certain, that the Aphredoderus is a Heteropygius among the Acanthopterygii, the only representative of a family analogous to that of which the Amblyopsis is the only representative among the Malacopterygii abdominales.

For the specimens examined by me I am indebted to F. W. Putnam, Esq., Superintendent Essex Institute, Salem, Mass.; Dr. Abbott of Trenton, and Dr. John L. Le Conte of Philadelphia.

inner webs blackish, with their bases white, increasing towards the outer feather, on which the white extends for two-thirds the length; the smaller wing coverts are of the same color as the back, the larger coverts, secondaries, and tertiaries are broadly bordered with white, appearing like a large and distinct patch on the wing; entire under plumage pure white; bill and feet black.

Length of skin, $5\frac{1}{4}$ in.; wing, 4; tail, 2; bill, from front, $\frac{4\frac{1}{2}}{16}$; width at gape, $\frac{3}{8}$; tarsi, $\frac{3}{8}$.

Habitat.—Ecuador, Quito.

Remarks.—In appearance most like *H. albiventris* from Brazil; but is of a lighter green, with no bluish shade, except slightly on the crown; the wings and rump are more conspicuously white, the latter having twice the extent of that color existing in *H. albiventris.* The latter species is rather larger, with a very much broader bill, and the outer edges of the inner secondaries only narrowly bordered with white.

FAM. FORMICARIDÆ.

2. **Thamnophilus leucopygus,** nov. sp.

Male. The upper part and sides of the head, including the eyes, and the upper part and middle of the back, glossy black; lower part of back and rump pure white; upper tail coverts and tail black, the latter narrowly ending with white; wings black, the quills narrowly margined with white, the outer webs of the scapulars and the ends of the middle wing coverts broadly white, the larger coverts have their outer margins narrowly white, and their ends more broadly so; entire under plumage soiled white, the cheeks, chin, lower part of the abdomen, and under tail coverts, purer, the neck, breast, sides, and abdomen, ashy; bill black; tarsi dull plumbeous brown.

Length about $6\frac{1}{2}$ in.; wing, $3\frac{1}{8}$; tail, 3; bill, $\frac{11}{16}$; tarsi, $\frac{15}{16}$.

Habitat.—New Granada, line of the Panama R. R., Lion Hill station. Collected by Mr. J. McLeannan.

Remarks.—The white rump appears to distinguish it from all its allies.

FAM. TYRANNIDÆ.

3. **Empidonax pectoralis**, nov. sp.

Male. Above dull olive, tinged with brown on the head, and on the back with rather bright tawny brown; tail of a light brownish liver color, edged with olive, except the outer feather, which has its margin greyish white; the smaller wing coverts are the color of the back, the others and the quills are liver brown, darker than the tail, the middle and larger coverts have their ends dull white, forming two bars across the wings; the secondaries and tertiaries with their outer margins dull white; under wing coverts very pale yellow; inner edges of primaries white; throat greyish white; across the breast a broad band of fulvous brown; abdomen and under tail coverts pale yellow; upper mandible dark brown, the under pale brown; feet dark brown.

Length, $4\frac{1}{2}$ in.; wing, $2\frac{5}{16}$; tail, 2; bill, $\frac{7}{16}$; tarsi, $\frac{5}{8}$.

tipped with white; quills brownish purple; throat and breast glittering green, with a golden tinge; abdomen green, much like the back in color; under tail coverts dull olive, with green centres, and bordered with greyish white; there is an oblong white patch just forward of and partly below the eye; bill black; feet yellowish brown, soles light yellow.

Length (fresh), $5\frac{1}{2}$ in.; wing, $2\frac{5}{8}$; tail, $1\frac{3}{4}$; bill, $\frac{15\frac{1}{2}}{16}$.

The female measures five inches in length, and differs otherwise only in having the throat of a deeper green, without the tinge of golden.

Habitat.—Costa Rica; the female collected at Angostura, June 15th, 1864; and the male at Juiz, March 14th, 1866, by J. Carmiol. Specimens in Mus. Smith. Institution, Nos. 34,922 and 41,476.

I have named this species in compliment to Prof. Joseph Henry, the learned Secretary of the Smithsonian Institution.

Remarks.—The specimen marked as a female was in a collection sent to me for examination from the Smith. Inst., in Nov., 1864. Being unable to identify the species, I desired to see the male, and one marked as such was received in April of the present year. There are no indications of the brilliant crown and throat spot, existing in the other species of this genus; but possibly the specimens before me may be immature, and the fully adult male may possess them. The only apparent evidence of the specimens not being mature is, that the white bases are visible on some of the feathers of the throat, and the tails are tipped with white; there is, however, no appearance of rufous or buffy colors to indicate youth.

The green coloring is much as in *H. Jamesoni*, and the size is about the same as of that species.

There is no record of any bird of this form having been hitherto found north of the Isthmus of Darien.

5. **Thaumatias viridicaudus,** nov sp.

Female. Front and crown dull green, the occiput bronzy, the rest of the upper plumage shining green; the four central tail feathers are grass green, all the others are green, having a subterminal band of blackish purple, with their ends ashy grey; wings brownish purple; throat, cheeks, middle of breast and of abdomen and under tail coverts white, sides of the breast and of the abdomen glittering grass green; "eyes black; upper mandible black, the lower pinkish till near the point, then black;" feet black, with the soles pale yellow.

Length (fresh), $4\frac{3}{4}$ in.; wing, $2\frac{3}{16}$; tail, $1\frac{3}{8}$; bill, $\frac{13}{16}$.

Habitat.—New Granada, Buenaventura. Collected by Mr. Fred. Hicks, August, 1864.

Specimen in Mus. Smith. Institution.

Remarks.—In size and general appearance this species somewhat resembles *T. leucogaster*, from Brazil and Guiana; but it has a shorter and rather stouter bill. In *T. leucogaster* the crown and cheeks are shining green, the outer tail feathers green; tail dark cinnamon, the terminal margins of the feathers are of a dull bronze, with a dusky or blackish shading, which also occupies the outer edges of all the feathers for a short distance from their ends, and on the outer edge of the lateral feather it extends to the base; wings brownish purple; entire under plumage of a uniform dark cinnamon; bill flesh color for two-thirds of its length, with the end dusky; feet dark brown.

Length of skin, $4\frac{3}{4}$ in.; wing, $2\frac{1}{16}$; tail, $1\frac{7}{8}$; bill, $\frac{15}{16}$.

Habitat.—Mexico, Tres Marias Islands.

Specimen in Mus. Smith. Institution, No. 42,538.

Collected by Col. A. J. Grayson, Mazatlan, whose name I with pleasure confer upon it, commemorative of his labors in behalf of science.

Remarks.—This fine species is allied to *A. cinnamomea*, but is much larger, with a stronger and very much wider bill at the base, and broader tail feathers; it is also much darker below, and has less green in its upper plumage, the crown being of a dull coppery bronze. In *A. cinnamomea* the entire plumage above is of a rather bright golden green, and the terminal margins of the tail feathers are of a golden bronze, instead of dull coppery bronze, as in the new species.

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Length of skin, $4\frac{3}{4}$ in.; wing, $2\frac{11}{16}$; tail, $1\frac{7}{8}$; bill, $\frac{15}{16}$.

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XLI.—*Description of a New Genus of* TRICHOPTERYGIDÆ, *lately discovered in the United States.*

BY THE REV. A. MATTHEWS, M.A.

(*Communicated by* DR. JOHN L. LE CONTE.)

Read March 25, 1867.

THE insect which forms the subject of the present memoir, is one of the most remarkable of an order replete with curious forms. In many Sections or Families of Coleoptera certain species exist so monstrous in their variation from the normal type as to render recognition extremely difficult. By the exertion of Dr. E. Brendel and Mr. Ulke, such a form has now been added to the *Trichopterygidæ;* and I feel much gratified in being permitted, through the kindness of Dr. Le Conte, to make known in its native country the discovery of this wonderful animal.

It appears, from the information I have received, to have been in the first instance captured by Dr. Brendel in Florida, and detailed description of its various parts, it will perhaps be advisable to mention those in which its more remarkable monstrosities occur. In outward form this curious insect strongly reminds one of some Crustacean genera, especially of the "Horse-shoe Crab," *Limulus Polyphemus.* All its limbs are very short; the antennæ, which consist of only nine joints, are wide and flattened in order that they may be the more easily withdrawn, together with the head, into a deep and closely fitting recess in the prothorax; the head itself shuts into this recess more by the action of a hinge than a true retraction; it is very small, and wholly without eyes, indeed all the ocular region is hollowed out; the organs of the mouth are large, and fully developed. In these the only remarkable character exists in the origin of the maxillary palpi, which rise from an elevated triangular process in the middle of the upper surface of the stipes; in all other genera of this family these appendages are joined to the upper angle of its outer edge. The development of the prosternum and of the keel of the mesosternum is truly monstrous, and unlike any existing form throughout the whole order; of these the former is very much elevated, excavated in front to receive the head, posteriorly it is produced into a wide and very long plate, convex, and deeply bifid at its extremity, passing over the whole length of the mesosternum and part of the metasternum, excavated on each side near the base to allow the forward action of the anterior coxæ; the keel of the mesosternum, which is for nearly half its length covered by the laminate process of the prosternum, is anteriorly very much elevated, and carried beyond the collar of the mesosternum, posteriorly it is expanded over the intermediate coxæ, and produced in a broad spoon-shaped plate beyond the apex of the metasternum, very wide, truncate and slightly emarginate at its extremity, which is rather thickly clothed with long hair. The object of this extraordinary formation, considered in connexion with the laminate processes of all the femora, and posterior coxæ, and the long shining hairs on the abdomen, appears to be to facilitate the escape of the insect in case of alarm; with all the limbs closed up, and protected in this manner, no inclined surface could arrest its downward progress. The legs are short to an absolute deformity, with all the femora widely laminate on their interior edge; the tibiæ curved outwardly, and armed on each side with numerous strong spines; the tarsi are furnished at the apex with two rather long, straight setæ; the posterior coxæ appear at first sight to be of great size, but are, in fact, almost rudimentary, nearly the whole joint consisting of an immense quadrate lamina, of which the coxa itself forms only the basal and interior margin; the abdomen is furnished on all the exposed segments with long, recumbent, golden setæ, which extend far beyond its apex in the shape of a long beard, and its terminal segment is divided into two points above and three below; the intermediate of these last being much shorter than the other two, and not connected with them at its

FAM. TRICHOPTERYGIDÆ.

GEN. LIMULODES Matthews.

Characteres Diagnosticæ.

Antennæ 9-articulatæ, compressæ, in recessu thoracico una cum capite recipiendæ.

Palpi Maxillares a medio stipitis exorti, graciles, elongati, articulo ultimo acuminato, sat robusto, haud recurvato, simplici, penultimo fere cylindrico, late truncato.

Palpi Labiales breves, robusti, ad basim valde incrassati.

Paraglossæ breves, acutæ.

Labrum magnum, antice late truncatum.

Mandibulæ graciliores, longius uncinnatæ, angulo præbasali magno, acuto.

Maxillæ lobo exteriori magno, robusto, intermedio brevi, apice valde incurvato, interiori valido, fortissime uncinato, dentibus tantum duobus armato.

Mentum ad basim attenuatum.

Caput in recessum thoracicum fere totum retractum.

Elytra truncata.

Prosternum in procursum latum postice longe productum.

Mesosternum carinatum, carinâ valde elevatâ, in procursum latum postice longe productum.

Metasternum inter coxas longe lateque productum.

Pedes brevissimi, coxis anticis remotis; intermediis, contingentibus; posticis longe remotis, ingenter quadrato-laminatis, femoribus omnibus late laminatis.

Descriptio Generica.

Corpus validissime convexum, conicum, antice latissimum, rotundatum, postice valde attenuatum.

Caput exiguum, deflexum, in recessum thoracicum fere totum retractum; oculi deficiuntur.

Antennæ brevissimæ, compressæ, in recessum thoracicum cum capite recipiendæ, 9-articulatæ, 1mo permagno subtriangulari; 2do permagno, latiori quam longo, primo breviori, lateribus rotundatis, antice profunde excavato; 3tio secundo triplo angustiori, duplo breviori, fere quadrato, lateraliter annulato, tribus quasi articulis in uno conjunctis; 4to cyathiformi, præcedenti parum breviori, pariter lato; 5to cyathiformi, quarto parum breviori et angustiori; 6to quinto duplo longiori et latiori, late cyathiformi, medio longe ac late umbilicato; 7mo præcedenti simili, sed multum latiori; 8vo fere omnino quadrato, septimo duplo longiori, pariter lato; 9mo conico, obtuso, octavo fere triplo longiori, pariter lato. Articuli ultimi pilis sat longis induti sunt.

Labrum corneum, truncato-conicum, vix longius quam latum, lateribus leviter rotundatis, ad basim abrupte dilatatis, apice late truncato, leviter excavato, setis brevibus ad angulum basalem unâ, ad angulum apicalem tribus utrinque instructum, margine basali fere rectâ.

Mandibulæ sat elongatæ, acutissime uncinatæ, acie breviter ac profunde excavatâ, angulo præbasali acuto, dorso rotunditer convexo, ad basim fortiter denticulato. Stipes sat magnus, in stylum robustum, acutum, valde incurvatum externe productus, longe sub basim cujus stylus alter brevis, gracilis, acutus, leviter incurvatus exoritur. Lamella membranacea tenuissima, magna, rotundata, longe ultra aciem mandibulæ extensa.

aciculari, basi rotundato. Articuli duo apicales setis paucis, brevibus utrinque instructi sunt.

Mentum corneum, subquadratum, antice latissimum, lateribus levissime concavatis, basi atque apice fere rectis, pilis remotis antice indutum, angulis anterioribus obtusis.

Labium coriaceum, elongato-quadratum, antice latissimum, pone mentum fere omnino occultum, apice recto; paraglossis simplicibus, haud elongatis, apicibus acutis, setâ apicali sat longâ, porrectâ instructis.

Palpi Labiales membranacei, breves, robusti, 4-articulati; 1mo sat brevi, transverso, lateribus valde rotundatis; 2do primo multo breviori, parum angustiori; 3tio præcedenti plusquam duplo longiori, multum graciliori, late bifido, apicibus acutissimis, setâ apicali sat longâ divergenti externe instructo; 4to exiguo, rotundato.

Lingua membranacea, brevis, lata, palpis pariter longa, apice bifido, ciliato.

Abdomen conicum, segmentis novem compositum, 5 basalibus membranaceis, 4 apicalibus corneis, 1mo, 2do, et 3tio obsoletioribus, quasi in uno conjunctis.

Subtus.

Caput exiguum, ore sat magno, parte gulari brevissimâ.

Prothorax permagnus, profundissime concavatus; prosterno magno, elevato, antice ad caput accipiendum quadrate ac profunde exciso, lateraliter rotundato, postice in laminam prælongam, latam, convexam, ad basim fortissime constrictam, lateribus ovalibus, apice profunde bifido, fere ad medium metasterni extenso; episternis magnis, epimeris parvis, triangularibus; receptaculis coxarum sat parvis, circularibus, longe remotis.

Pectus mesosterno brevi, alte carinato, angulis anticis obtusis, margine posteriori valde concavatâ; carinâ antice valde elevatâ, valde convexâ, longius ultra collum mesosterni productâ, acie deplanatâ, leviter crenulata, postice late cochleariformi supra coxas valde dilatatâ, valde elongatâ, ultra apicem metasterni extensâ, lateribus deflexis, apice lato, truncato, leviter emarginato pilis longis vestito; episternis angustissimis, externe parum dilatatis; epimeris exiguis, ovalibus, sub elytris occultis; receptaculis coxarum magnis, circularibus, contingentibus: metasterno perbrevi, ad latera validissime curvato, postice inter coxas longe ac late producto, apice recto, angulis acutis, ad coxas accipiendas profunde excavato; episternis sat magnis rotundatis, sub elytris occultis: epimeris exiguis, triangularibus, sub elytris occultis; coxis longe remotis.

Venter attenuatum, sat elongatum, segmentis sex compositum.

Pedes antici coxis fere quadratis, permagnis; trochanteribus exiguis; femoribus brevibus, robustissimis, interne latissime laminatis; tibiis compressis; tarsis triarticulatis, 1mo perbrevi, 2do primo plusquam duplo longiori, parum tenuiori, 3tio elongato, gracili, duobus basalibus plusquam duplo longiori, setis duabus, brevibus, porrectis ad apicem instructo; unguibus elongatis compressis, vix curvatis, ad basim valde dilatatis; *intermedii* coxis magnis, ovalibus, alioqui anticis similes; *postici* coxis angustissimis, latissime quadrato-laminatis; trochanteribus elongatis, incurvatis, claviformibus; femoribus brevibus, robustis, intus ad apicem late elongato-laminatis; alioqui anticis similes.

L. Paradoxus, Matthews.

$\frac{1}{16}$-lin. Totus rufotestaceus, pube sat longâ, argenteâ, sericeâ dense vestitus; pronoto permagno, glabro, sat nitido, elytroregulariter punctata, puncturis reticulatim dispositis, atque lineis rectis inter sese omnibus conjunctis.

Abdomen sat elongatum, valde attenuatum, segmentis quatuor apicalibus setis aureis longissimis longe ultra apicem abdominis extensis instructis, duobus ultimis præcedenti multo longioribus, apicali superiori profunde ac late bifido, apicibus obtusis inferiori pariter bifido, mucrone etiam acuto, breviori, elongato-triangularis, e basi segmenti exorto, armato.

Pedes brevissimi, robustissimi, rufotestacei, pilosi; femoribus brevibus; tibiis compressis, ad apicem attenuatis, ad basim internum abrupte ac profunde excavatis, calcaribus multis armatis (anticis 2 externis, 5 internis; intermediis 5 externis, 10 internis; posticis 2 longis externis, 10 internis); tarsis brevibus simplicibus.

Alæ nullæ.

Subtus totus rufotestaceus.

EXPLANATION OF PLATE. (NO. 15.)

1. Limulodes paradoxus.
2. do. do. under side.
    - *a.* Prosternum.
    - *b.* Episternum of prothorax.
    - *c.* Epimeron of prothorax.
    - *d.* Episternum of mesosternum.
3. Antenna.
4. Posterior leg.
5. Mandible.
6. Mentum, labium, paraglossæ, palpi and lingua.
7. Labrum.
8. Maxilla and palpus.
9. Carina of mesosternum.

XLII.—*Notes on Species of the Family* Corbiculadæ, *with Figures.*

By Temple Prime.

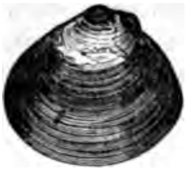
(*Continued from page* 237.)

Read March 25, 1867.

Genus CORBICULA.

46. **Corbicula insularis,** nov. spec.

Fig. 67.



Corbicula insularis.

C. testa orbiculata-trigona, compressiuscula, sub-aequilaterali; antice latiore; epidermide olivaceo-flava, nitente vestita; striis regularibus; umbonibus inflatis, obtusis; valvis intus pallide violaceis; cardine angulato incrassato.

Long. 23; lat. 21; diam. 14 mill.

Hab.—Insula Formosa. Collect. Prime.

The shell is orbicular, trigonal, somewhat compressed, and nearly equilateral. The anterior side is the broader. The epidermis is olive-yellow and polished. The striæ are regular. The beaks are inflated and obtuse. The interior of the valves is pale violet. The hinge is angular and strong.

tumidis, brevibus; valvis intus violaceo-rubris; cardine angusto; lunula ovato-lanceolata, pallida.

Long. 22; lat. 17; diam. 12 mill.

Hab.—? Collect. Prime.

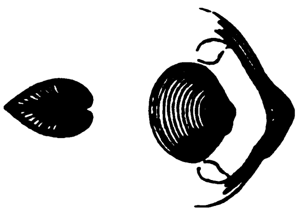
The shell is transversely-oval, somewhat compressed, and nearly equilateral. The anterior side is subangular, and the posterior is subtruncated. The epidermis is yellowish-green and polished, and has markings of dark violet on the beaks. The beaks are small and somewhat raised. The interior of the valves is dark purplish violet. The hinge is narrow. The lunula is distinct, and of a lighter color than the rest of the shell.

Comparing it with *Corb. occidens* from India, with which it is closely allied, we find that the beaks are smaller, and that the hinge is slighter; the main difference, however, consists in the fact, that in *Corb. mediocris* the anterior side is distended and angular, whereas in *Corb. occidens* it is rounded.

48. **Corbicula Larnaudieri**, Prime.

Corbicula *Larnaudieri*, Prime. Annals N. Y. Lyceum Nat. Hist., vol. vii. 480. 1862. Prim. Cat. 3. 1863.

FIG. 69.



Corbicula Larnaudieri.

C. testa parvula, ovato-transversa, inaequilaterali,convexiuscula; utraque extremitate rotundata; epidermide flavescente-viridi vestita, ad umbones atro violascente maculata; striis regularibus distantibus; umbonibus brevibus, turgidulis, incurvis; valvis intus violaceis; cardine angusto; lunula ovato-lanceolata, pallida.

Long. 13; lat. 11; diam. 7 mill.

Hab.—Siam. Collect. Prime.

The shell is small, transversely-oval, inequilateral, and somewhat convex. The margins are rounded. The epidermis is yellowish-green and polished, and has markings of dark violet on the beaks. The striæ are regular and distant. The beaks are small and somewhat raised, and they curve inwardly at the apex. The hinge is slight. The lunula is distinct, and of a lighter color than the rest of the shell.

Somewhat like *Corb. tumida* from Borneo, but smaller, less heavy, more inequilateral, and less convex; the striæ are closer, and the epidermis is lighter, and more highly polished.

This species, named in honor of the Abbé Larnaudier, who formed part of the mission sent to Siam some years since by the French, was discovered by that gentleman. The only specimens collected are in my cabinet; they were received through the late Chevalier Bernardi of Paris.

The following species will be figured at some future time.

49. **Corbicula Moreletiana,** nov. sp.

C. testa trigona, triangulari, tumidula; epidermide viridi fusces- [redacted]

51. **Corbicula consanguinea,** nov. spec.

C. testa ovato-transversa, compressiuscula, aequilaterali; epidermide viridescente, nitente vestita; regulariter striata; umbonibus brevibus, atro-violascentibus; valvis intus violaceis; cardine lato.

Long. 16; lat. 14; diam. 9 mill.

Hab.—India.

Very closely allied to *Corb. striatella* (page 74, fig. 22); the lateral teeth in *Corb. consanguinea* are stronger and much broader than in *Corb. striatella.*

52. **Corbicula Pfeifferiana,** nov. spec.

C. testa cordiformi, subaequilaterali, epidermide flavescente vestita; sulcis distantibus, umbonibus tumidis, incurvis, approximatis; cardine lato.

Long. 15; lat. 14; diam. 10 mill.

Hab.—China.

Genus CYRENA.

10. **Cyrena exquisita,** nov. spec.

C. testa subquadrangulari, compressiuscula; epidermide olivaceo-fuscescente vestita; striis regularissimis, approximatis; umbonibus acutis, brevibus; valvis intus purpureis; sinu pallii profunde intrante.

Long. 24; lat. 22; diam. 12 mill.

Hab.—In flumine Chepo prope Panama, Novæ Granadæ.

11. **Cyrena germana,** nov. spec.

C. testa orbiculato-trigona, subaequilaterali, compressiuscula; epidermide olivaceo-lutescente vestita; striis regularibus; umbonibus brevibus, incurvis; valvis intus violaceis; sinu pallii profunde intrante.

Long. 43; lat. 38; diam. 24 mill.

Hab.—In flumine Panaco prope Tampico, Mexico.

12. **Cyrena Chilina,** nov. spec.

C. testa trigona, inaequilaterali, compressiuscula; epidermide olivacea vestita; striis irregularibus; umbonibus brevibus; valvis intus pallide violaceis, sinu pallii angulari.

Long. 52; lat. 43; diam. 28 mill.

Hab.—Chili, Americæ Meridionalis.

Genus VELORITA.

2. **Velorita parvula,** nov. spec.

V. testa parvula, cuneiformi, cordato-trigona, valde inaequilaterali; epidermide atro-viridi, nitentissime vestita; umbonibus inflatis, incurvis; valvis intus superne rubescentibus ad margines pallide coeruleis.

Long. 21; lat. 18; diam. 13 mill.

Hab.—? Collect. Prime.

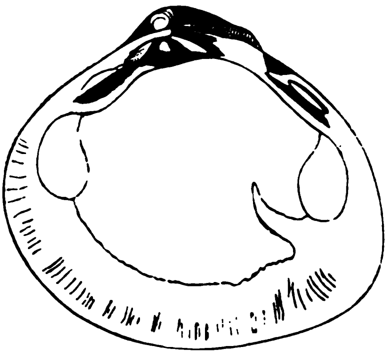
It is not my object at present to propose any modification in the classification now used; in fact, I think that in the actual state of our knowledge of the soft parts of Corbiculadæ, any change introduced would be inopportune at this moment, and only lead to future confusion, without producing any permanent benefit. What I have in view is to call attention to certain characters derived from the soft parts, indicated, however, by an examination of the shell, and the existence of which has, as yet, not been sufficiently noted.

Formerly all the species of Corbiculadæ were looked upon as having a continuous palleal impression, and the family was always described as such; it was only when attention was turned to American Corbiculadæ, that it was noticed that certain species of Cyrena and Corbicula showed a palleal impression with a sinus.

I am speaking now more particularly of the genera Cyrena and Corbicula, as all the species of Batissa, Sphærium, and Pisidium, show an unbroken palleal impression. As regards Velorita, I will say a few words later.

All the American species of Cyrena that have passed through my hands, exhibit a sinus, commonly long and sinuous; in all the exotic species I have seen the sinus is absent.

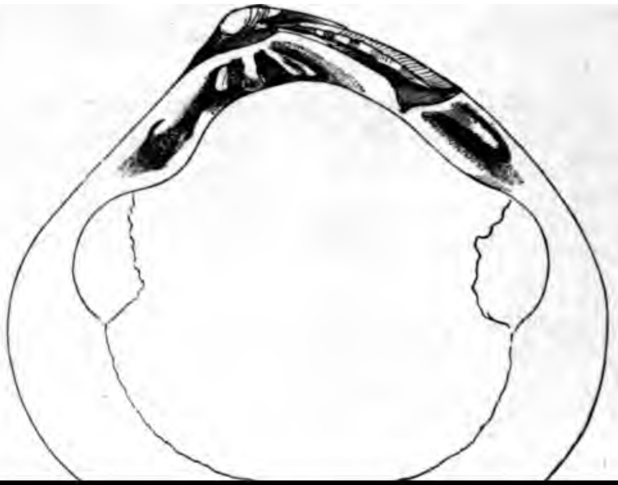
FIG. 1.



Cyrena fortis, from Ecuador.

Deshayes, however, in his edition of Lamarck, says that the *Cyrena oblonga*, Quoy, from the Islands of the Pacific, has a sinus. Not having met with this species, I can give no opinion. The accompanying figures of *Cyrena fortis*, from Ecuador, and of *Cyrena triangularis*, from Borneo, illustrate my meaning.

Fig. 2.

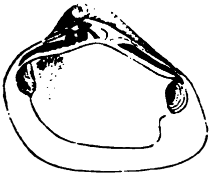


and the exotic species have none. The sinus of the Corbicula, I will note, is usually shorter and less sinuous than that of Cyrena. I refer to the annexed figures of *Corbicula obsoleta*, from South America, and of *Corbicula Largillierti*, from China.

So far I have spoken only of the recent species of Cyrena and Corbicula; one fossil species of Corbicula from America, the *Corbicula densata*, Conrad, I am informed by Mr. Conrad, possesses no sinus; I have not had an opportunity of examining the shell myself. In this connexion I will mention that three fossil species of the genus Corbicula from the Basin of Paris, which I have in my possession, the *Corbicula antiqua*, *cuneiformis* and *Forbesii*, show certainly a very marked indentation in the region where the palleal impression is joined to the posterior adductor muscle. The figure of *Corbicula antiqua* will exhibit what I refer to.

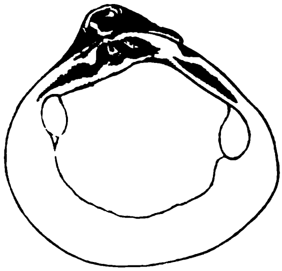
With regard to Velorita, of the three species known, I have examined two, the one represented below, and *Velorita parvula*, and they certainly exhibit indications of a sinus.

FIG. 5.



Corbicula antiqua (fossil), from the Basin of Paris.

FIG. 6.



Velorita Cochinensis, from Cochinchina.

The presence or absence of a sinus has always been considered a generic distinction, and it may be necessary to subdivide the Corbiculadæ according to this test. It behoves us, however, to be cautious, because it is possible that too much importance has been attached to this feature.

I am led to make this remark, from the fact that Fischer, of Paris, in his examination of the soft parts of *Corbicula Largillierti*, discovered that this species has a syphonal retractory muscle, rudimentary, it is true, but still quite evident, though the shell (see Fig. 4) shows no indication of a broken palleal line. So little is known of the anatomy of Corbiculadæ, that I think it not out of place to insert here a translation of Fischer's paper, with the figures accompanying it.

The Anatomy of Corbicula Largillierti, by M. P. Fischer.

§ I.—Our knowledge of the anatomy of Corbicula is very incomplete, no memoir of any extent having been published on the subject. What we have is confined to a few words inserted by Rang in his observations on the animal of Galatea radiata (Ann. Sc. Nat. t. XXV., 1832), and to the brief generic characters given by Woodward, Gray, Adams, etc.

Mr. Debeaux, during his residence in China, collected specimens of the animal of Corbicula Largillierti, and entrusted them to me. Although they have been somewhat influenced mantle lobes are lengthened, they become broad, they gape, and they constitute the rear cavity of the syphons. Finally, above the posterior adductor, the lobes are joined anew, they become thickened, they follow on between the beaks and continue, still united, towards the anterior and superior side, where they are introduced between the cardinal teeth of the shell. The mantle has two large openings, an anterior one for the exit of the foot, and a posterior one for that of the syphons.

Owing to the proximity of the adductors to the ventral margin, the pedal aperture of the mantle is less long, than in Galatea for instance, in which genus the adductors are nearer the beaks.

The interior of the mantle is provided with a row of small conical tentacles, which are barely visible.

§ III.—The muscular arrangement. The anterior adductor is crescent-shaped, the convex side being towards the anterior margin of the shell; the posterior adductor is oval, the major axis being about vertical, and it is surmounted by the retractory pedal muscle. There is a palleal muscle, which is quite broad, of medium thickness, and is constituted of radiating fibres. A bundle of strengthening fibres starts from the inferior and anterior side of the anterior adductor proceeding towards the dorsal side of the mantle. The same conformation holds good at the junction of the palleal muscle with the posterior adductor. The shell, on examination, shows no well-defined palleal sinus, but the palleal line rises a little before it is united to the impression of the posterior adductor. There being no sinus in Corbicula, it was thought that in this genus there existed no retractory syphonal muscle, and that consequently there were no syphons. Such, however, is not the case, the retractory syphonal muscle is present, though very rudimentary, and is so intimately connected with the palleal muscle that it is difficult to limit it. It may, however, be recognised by the rounded outline of its anterior margin, and by the thickening of the fibres.

It corresponds to the slight sinuosity seen in the shell at the posterior termination of the palleal line.

§ IV.—The syphons. The genus Corbicula is provided with genuine syphons; these organs are, however, unusually short. Considering them from the branchial chamber, they have the appearance of two circular apertures, of equal diameter, placed one above the other. Examining them in the rear cavity of the syphons, they resemble two vertical button-holes, separated by a horizontal plait; the inferior syphon (the branchial) is somewhat longer than the superior (the anal) syphon. In both syphons the edges are approximate, and are furnished with conical tentacles. The tissue consists of longitudinal and circular fibres. In all probability, when the animal is alive, the syphons are capable of being projected to the extent of several millimetres. The syphons are invariably separate.

§ V.—The breathing system. The gills, or branchiæ, are quadrangular, and are elongated from the anterior to the posterior side. Owing to the external gill being less high than the internal one, the latter projects forward and below. A narrow prolongation of the external gill is formed on the oblique dorsal fleshy, and thick. The interior surface of the external palpus, and the exterior surface of the internal palpus, are marked by oblique striæ. The whole surface of the palpi is not covered by these striæ, the margin being perfectly smooth. The mouth is quite broad, the lips and the balance of the digestive organs are similar to those of Galatea.

The abdominal mass is broad and high, and below it is completed by a foot, slightly angular in front, and rounded behind. The foot of Corbicula is less high and less thick than that of Galatea.

Not having examined the entire nervous system, I can only say that the branchial ganglion is very narrow. The arrangement of the heart and of the vessels offers nothing worthy of note.

§ VII.—I deduce from this examination that the genus Corbicula is very closely allied to the large family of "Les Conques;" the fact that the palleal impression is simple and not sinuated, is not, in my estimation, reason sufficient for excluding it from this family.

We have seen that the syphons exist, though in a rudimentary state, and that the apertures of the mantle, and the conformation of the gills, are the same as in "Les Conques."

We have already remarked, in connexion with the genus Galatea, that an examination of the anatomy of Psammobidæ, Donacidæ, Lithophagi, "Les Conques," and "Les Cyclades," accepting these families as defined by Deshayes, shows no evidence of any important differences in the structure of these different families; they all bear the impress of a similar organization.

It is a matter of but little importance in which of the above groups we place Corbicula and its kindred genera (Velorita, Batissa, and Cyrena); I, myself, would place them near Galatea, as their habits are similar, without even taking into consideration that certain species of Galatea undergo such modifications as to pass insensibly into one of the above genera.

The permanent distinctive characters of the genus Corbicula are, that the gills are never soldered behind to that of the opposite side, and that the syphons are always very small.

I call attention, moreover, to the astonishing affinities existing between Corbicula and Iridina, as far at least as the soft parts are concerned.

Fig. 7.

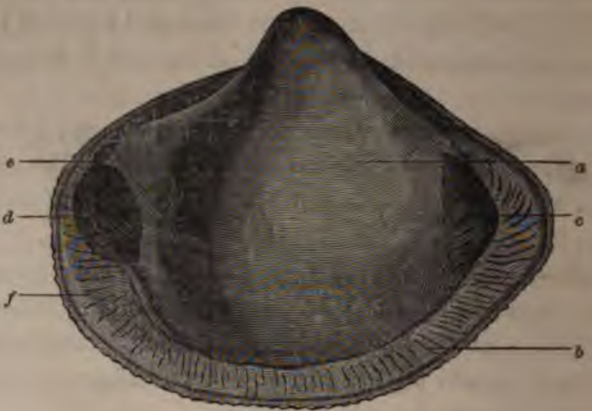


Fig. 8.

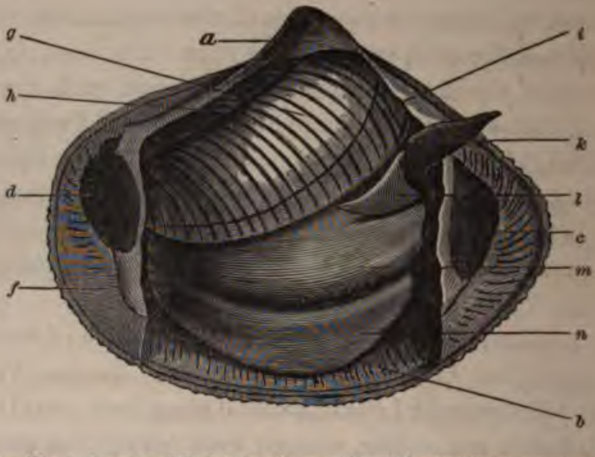


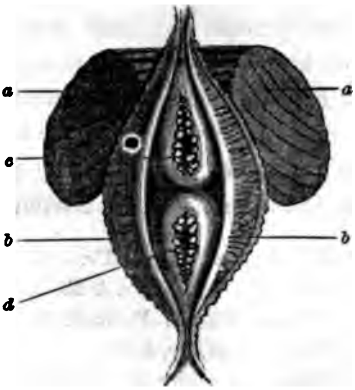
Fig. 7.—The soft parts of Corbicula, the mantle not having been removed. *a*, the mantle; *b*, the palleal muscle; *c*, the anterior adductor; *d*, the posterior adductor; *e*, the retractory pedal muscle; *f*, the retractory syphonal muscle.

Fig. 8.—The same, the mantle having been removed. Same lettering as in Fig. 7. *a g*, inferior portion of the external gill; *k*, external palpus; *l*, internal palpus; *m*, abdominal mass; *n*, the foot.

Fig. 9.—Rear cavity of the syphons seen from behind; *a*, posterior adductor; *b*, posterior folds of the mantle spread out and thrown back; these folds constitute the lateral walls of the rear cavity of the syphons; *c*, anal syphon; *d*, branchial syphon.

The figures are very much magnified.—*Journal de Conchyliologie*, vol. xi. 1863.

Fig. 9.



I hope the remarks I have made will call the attention of naturalists to this subject, and will induce collectors to remedy the present existing want by procuring alcoholic specimens of the soft parts of the species of this family, not only from America, but from other parts of the world, enabling us thereby, at some future time, to arrive at a classification of the Corbiculadæ which shall rest upon a true basis, characters drawn from an examination of both the soft and hard parts of the animal.

XLIV.—*Catalogue of Marine Mollusks collected in the Bahama Islands in November*, 1866.

By Henry J. Krebs.

(*Communicated by T. Bland.*)

Read April 8, 1867.

(*Abbreviations.* N. Pr., New Providence; E., Eleuthera; W., Watling's Island; C., Conception; A., Andros.)

The whole group of islands which extends between the twenty-first and the twenty-eighth degrees N. Lat., and between the seventieth and eightieth degrees W. Long., is generally designated by the term "Bahama Islands." But there are, in fact, three groups; viz., the Turk Islands, the Caicos Islands, and the Bahama Islands. Precise information as to the localities in which marine species of mollusks are found in these three groups of islands would, we think, add considerably to our knowledge of the geographical distribution of the species, as it certainly will be confirmed that many West-Indian species (tropical forms) have their northern limit within these islands. We therefore publish the following list of the 245 species which we collected in November, 1866.

Aplysia protea Rang. N. Pr.
Arca antiquata L. N. Pr. & E.
" Listeri Phil. N. Pr. & E.
" noae L. N. Pr. & E.
" squamosa Lmk. N. Pr. & E.
" umbonata Lmk. N. Pr. & E.
Astralium phoebia Bolt. N. Pr. & E.
Avicula colymbus Bolt. N. Pr.
" crocata Swains. Bahama.*
Buccinum auriculatum Lmk. N. Pr. & E.

Cardium muricatum L. N. Pr. & E.
" Petitianum d'Orb. N. Pr. & W.
Cardium spinosum Meusch. Bahama.
" subelongatum Sowb. Bahama.
Cassis flammea L. Bahama.
" madegascariensis Lmk. Bahama.
Cassis testiculus Lmk. Bahama.
" tuberosa L. Bahama.

Cerithium nigrescens Mk. N. Pr. & E.
Cerithium septemstriatum Say. N. Pr. & E.
Cerithium terebellum C. B. Ad. N. Pr.
Cerithium versicolor C. B. Ad. E.
" variabile C. B. Ad. N. Pr. & E.
Chama ferruginea Reeve. Bahama.
" florida Lmk. Bahama.
" macrophylla Chem. Bahama.
" sarda Reeve E.
Chiton piceus Gml. N. Pr. & E.
Coecum—2 spec. ? Bahama.
Columbella catenata Sowb. Bahama.
" lactea Sowb. Bahama.
" mercatoria L. N. Pr., E., & W.
Columbella nitida Lmk. N. Pr., E., & W.
Columbella ocellata Gml. Bahama.
" ovulata Lmk. Bahama, & W.
Conus cedo-nulli L. W.
" daucus L. Bahama.
" granulatus L. Bahama.
" leucostictus Hw. Bahama.
" mindanus Hw. N. Pr., E. & W.
Conus mus Hw. N. Pr. & E.
" 2 spec. ind. Bahama.
" 1 " ". Conception.
Crucibulum auriculatum Chem. Bahama.
Cypræa exanthema L. N. Pr. & E.
" nivea Gray Bahama.
" pediculus L. Bahama, E., N. Pr. & W.
Cypræa rotunda Kien. Bahama.
" spurca L. W.& C.
Cypræa succincta L. N. Pr. & E.
" suffusa Gray Bahama.
Daphnella lymnœiformis Kien. Bahama.
Dentalium—3 spec. ind. Bahama.
Diplodonta semiaspera Phil. Bahama.
Dolium galea L. N. Pr. & E.
" pennatum Mart. N. Pr. & E.
Emarginula—? spec. ind. Bahama.
" octoradiata Gml. Bahama.
Eulima 2 spec. ind. Bahama.
Fasciolaria Tulipa Lmk. N. Pr. & E.
Fissurella barbadensis Gml. N. Pr. & E.
Fissurella cancellata Sowb. N. Pr.
" gemmulata Reeve Bahama.
" graeca L. N. Pr. & E.
" pustula L. N. Pr. & W.
Fusus—?—E.
Ianthina planispira Reeve. Bahama.
Lima scabra Born. E.
Liotia cruentata Mühlf. E.
Litiopa—1 spec. ind.—E. & N. Pr.
Littorina Antonii Phil. N. Pr. & E.
" lineata d'Orb. N. Pr. & E.
" muricata L.—all the Bahamas.
Littorina mespilum Mühlf. N. Pr. & E.
Littorina ziczac Chem. N. Pr.
Lucina aurantia Desh. Bahama.
" jamaicensis Spl. N. Pr. & E.
" obliqua Reeve. E.
" pecten Lmk. E.
" quadrisulcata d'Orb. Bahama.
" pennsylvanica L. Bahama.
" tigerina L. N. Pr. & E.
Mactra brasiliana Lmk. N. Pr.
Mangelia—3 spec. ind. Bahama.
Marginella apicina Mke. E. & N. Pr.
" guttata Mke. Bahama.

Marginella pellucida Pfr. N. Pr.
" Lavalleana d'Orb. Bahama.
" maculosa Kien. E. & N. Pr.
Marginella pallida L. Bahama.
Melina perna L. N. Pr. & E.
Mitra barbadensis Gml. N. Pr., E. & W.
Mitra dermestina Lmk. Bahama.
" nodulosa Gml. N. Pr., E. & W.
" puella Reeve. W. & E.
Mitrularia equestris Lmk.
Modiolus americanus T. d'H. E. & N. Pr.
Modiolus modiolus L. N. Pr. & E.
Modulus lenticularis Chem. N. Pr. & E.
Murex rufus Lmk. E.
" pauperculus C. B. Ad. N. Pr. & E.
Murex pomiformis Mart. Bahama.
" ? N. Pr. & E.
" ? N. Pr. & E.
Oniscia oniscus Lmk. Bahama. E.
Ostrea frons L. Bahama A. ?
Ovula acicularis Lmk. E., N. Pr.
" gibbosa Lmk. Bahama.
Patella pallescens Phil. N. Pr.
" antillarum Sowb. N. Pr.
Pecten nucleus Born. Bahama.
" imbricatus Gm. Bahama.
" ornatus Lmk. Bahama.
" ziczac L. N. Pr. & E.
Pectunculus decussatus L. N. Pr.
" minimus Gml. E.
" sericatus Reeve. N. Pr.
Petricola lapicida Chem. Bahama.
" typica Jonas. Bahama.
Phasianella 1 spec. N. Pr.
Pinna muricata L. N. Pr. (said to be there.)
Pinna pernula Chem. N. Pr. & E.
Pisania pennata Brown. Bahama.
Planaxis nucleus Lmk. N. Pr.
" lineatus Da. Cost. E.
Pleurotoma—4 spec. Bahama.

Semele purpurascens Gm. N. Pr.
Sigaretus depressus Phil. Bahama.
Siphonaria alternata Say. E.
Solarium infundibuliformis Chem. Bahama.
Spondylus fimbriatus Meusch. Bahama.
Strombus gigas L. N. Pr. & E.
  " inermis Sowb. N. Pr. & E.
  " pugilis L. N. Pr. & E.
Tellina bimaculata L. Bahama.
  " caribaea d'Orb. N. Pr.
  " carnaria L. W. & C.
  " fausta Soldr. Bahama.
  " interrupta Soldr. N. Pr.
  " laevis Chem. N. Pr.
  " pisiformis L. N. Pr.
  " radiata L. Bahama.
Tezebra hastata Gml. N. Pr., W.
  " ? A.
  " ? E.
  " ? W.
Typhis? N. Pr. & E.
Tritonium antillarum d'Orb. N. Pr. & E.
  " chlorostomum Lmk. N. Pr. & E.
  " cynocephalum Lmk. Bahama.
  " femorale L. N. Pr. & E.
  " labiosum Wood. N. Pr. & E. & W.
Tritonium piliare L. N. Pr. & E.
  " parvum C. B. Ad. N. Pr. & E.
  " pulchellum C. B. Ad. N. Pr. E., & W.
  " testaceum Meusch. N. Pr.
  " variegatum Lmk. N. Pr.
  " ? N. Pr. & E.
Trochus fasciatus Born. N. Pr. & E.
  " ?
Turbinella brevicaudata Reeve N. Pr. & E.
Turbinella leucozonalis Lmk. N. Pr. & E.
Turbinella nana Reeve. N. Pr. & E.
  " scolymus (auct?) N. Pr.
Turbo pica L. N. Pr. & E.
Turritella exoleta L. W.
Venus flexuosa L. Bahama.
  " granulata Gml. N. Pr. & E.
  " Listeri Gray Bahama.
  " maculata L. N. Pr.
  " paphia L. N. Pr. & E.
  " pygmaea Lmk. N. Pr.
  " subrostrata Lmk. N. Pr.
  " ziczac L. N. Pr. & E.
Vermetus—?—N. Pr.
Volvaria pellucida Schm. Bahama.
Xenophora trochiformis Born. Bahama.

XLV.—*Notes on the Lepidoptera of America.*

No. 1.

BY AUG. R. GROTE AND COLEMAN T. ROBINSON.

Read April 15, 1867.

Family, NYMPHALIDAE.

GRAPTA, *Kirby.*

Grapta gracilis, n. s.

Male and *Female.* *Upperside*, much the same as in Grapta faunus, *Edwards;* the preapical oblique dark brown costal band of the primaries is constantly more diffuse, and the succeeding yellowish marks more restricted, than in its congener. Usually there is a third fainter black spot on the interspace above first median nervule. On the secondaries, the terminal dark band is narrower than in G. faunus, and the sub-terminal, interspaceal, yellow-fulvous marks, while deeper in color, are brought nearer to the external margin; within these, the dark color is less intense and shades more rapidly to brownish, than in its congener. All the exserted portions of the external margins on both wings are nar-

This species may at once be distinguished from G. faunus, by its smaller size, and the distinct ornamentation of the under surface, which wants all the green scales and spots which characterize its congener, as well as the dusky fulvous apical and terminal shades which occur on both wings beneath in G. faunus. Messrs. C. T. Robinson and F. G. Sanborn have communicated the specimens which form the basis of the present description. This species appears a more closely knit form compared with either G. C-argenteum, or G. faunus, when the narrower serrations of the external margins of the wings and its total appearance are taken into consideration.

Mr. Scudder's remarks, in his "Butterflies of New England," Proc. Essex Institute, April, 1863, undoubtedly apply to Grapta gracilis, and are as follows:

"I have taken four specimens of a *Grapta* at the White Mountains from the valleys to the summit, which may possibly belong to this species (*i. e.* G. C-argenteum, *Kirby*), but seem to indicate the presence of a new species; it is fully as small as, if not smaller, than *G. C-argenteum*, its upper surface is like that of *G. faunus*, while its under surface is more like *G. C-argenteum*, but differs from that in having the broad ashy band quite hoary, nearly white, and extending also with equal distinctness across the secondaries; the discal spot of secondaries is a white L with both limbs nearly equal similar and straight."—l. c. p. 169.

Family, HESPERIIDAE.

HESPERIA, *Fabr.*

Hesperia bimacula, n. s.

Female. Head, above, and prothorax, covered with dark brassy yellow scales; the tips of the palpi are stained with the same shade. Thorax and abdomen, above, blackish, clothed with lateral, longer, mixed olivaceous and aeneous hair. Beneath, the palpi are white; the eyes are also margined narrowly with white. Thoracic parts, beneath, clothed with longer, mixed griseous and whitish hair. Abdomen, beneath, whitish, with longitudinal darker streaks, laterally clothed with mixed griseous scales. Legs, obscure aeneous; femora with white scales inwardly. Antennae, rather short and stout; above, sub-annulate; "club," blackish; beneath, more plainly annulate with yellowish white, the apices tinged with dark fulvous.

Wings, broad, somewhat longitudinally wrinkled; above, lustrous olivaceous brown, with dark olivaceous longer scales. Anterior wings, above, without markings, except two, unequal, pale yellowish, obliquely placed maculations at the base of the interspaces between the upper median nervules. Of these, the upper is much the smaller, and is brought nearer the external margin than the lower; beneath this latter there are faint indications of a third, paler spot, above the internal nervure. Base of the wing and costal region, sparsely clothed with obscure aeneous-yellow scales; fringes, prominent, *whitish*, with a faint darker basal shade. Posterior wings, immaculate, with longer, aeneous olivaceous and yellowish hairs spreading over the disc and along internal margin, this latter as long as the abdomen, anal angle slightly

Family, SPHINGIDAE.

Tribe, *Macroglossini.*

HAEMORRHAGIA, *Grote and Robinson.*

Sesia, p., Fabr., Walk., Clemens.
Cephonodes, p., Hübner.
Macroglossa, p., Boisd.

GROUP I. (*Aberrant.*)

Discal cell of primaries free. Vitreous field of secondaries crossed by five nervules. Sp. 1.

Thorax beneath with lateral red shades....................1 H. gracilis, *G. & R.!*

GROUP II. (*Typical.*)

Discal cell of primaries crossed by a longitudinal bar. Vitreous field of secondaries crossed by six nervules. Sp. 2–5.

- Inner margin of external band of ♂ primaries dentate on the interspaces. Sp. 3 and 4.
    - Abdomen shaded with olivaceous on the sides of terminal segments........3 H. thysbe, *G. & R.!*
    - Abdomen terminally entirely deep red...............4 H.fuscicaudis,(*Boisd.*)—
- Inner margin of external band of ♂ primaries not dentate on the interspaces. Sp. 2 and 5.
    - Size moderate. Hind tarsi red..................2 H. buffaloensis, *G. & R.!*
    - Size large. Hind tarsi black................5 H. floridensis, *G. & R.!*

Haemorrhagia gracilis, *Grote and Robinson.*

Haemorrhagia gracilis, G. & R., Syn. Cat. N. A. Sph. p. 26, Plate 3 figs. 1–2 ♂, P. E. S. P. Nov., 1865.

♂. Form somewhat small and slight. Head and thorax, above, clothed with olive green appressed hair; basal abdominal segments, above, similarly colored. Palpi, black at the tips, whitish beneath. Orbits of the eyes, white; in front of these a few whitish scales. Laterally, the under thoracic parts are clothed with long white hair, extending from behind the eyes to base of secondaries. Centrally, the under thoracic parts are clothed with long white hair, which is separated from the lateral white hair by two sub-lateral broad stripes of long reddish hair; a character which is very distinctive when we compare it with the concolorous pectus of allied species. Anterior femora clothed with thick white hair. Anterior tibiæ, pale red, as are also the middle and posterior legs, both femora, tibiæ, and tarsi. Abdomen, except basal segments above, dark red; third basal segment fringed anteriorly with pale hairs; fourth, dorsally, with a few similarly colored appressed hairs; fifth and sixth, with a few pale lateral hairs. Anal tuft, black laterally, centrally pale red. Under surface of abdomen, pale red, with a central sub-obsolete series of pale spots composed of aggregated hairs. Laterally, spots of similar pale hairs at the base of the segments. The sides of the abdomen show sub-tufts fringed above with pale yellowish, similarly colored hair to that forming

Expanse, ♂, 1.75 inch. *Length of body*, 0.85 inch.

Habitat.—Canada West (Saunders).

We have as yet but a single male specimen before us, which came originally from Mr. Bowles' Collection. We have conjectured (l. c.) that Sesia ruficaudis, *Walker* (non Kirby), was based upon the present species. From a comparison between Kirby's description and that given in the British Museum Lists, it is evident that these refer to distinct species, and the descriptions have been properly kept apart by Dr. Clemens. From the brevity of Mr. Walker's description, it cannot be properly ascertained what species is referred to, and the few points of resemblance between the description of S. ruficaudis, *Walker*, and H. gracilis, *nob.*, may be accidental, a view which derives some support by the circumstance that Mr. Walker adds to his description the remark: "This is probably a mere variety of S. thysbe"—a phrase that could not properly be applied to the very distinct H. gracilis. We have already (l. c.) given Kirby's description of S. ruficaudis, a description which will not apply to any species known to us, but probably to one which yet remains to be rediscovered.

Haemorrhagia buffaloensis, n. s.

(Plate 16, figs. 18 ♂, 19 ♀.)

Male. Head, above, deep green; palpi, smoothly scaled, converging at the tips which prominently exceed the "front," blackish above and laterally, beneath, with the entire under thoracic surface, pale yellowish white; eyes margined below with pure white scales; maxillae, well developed, blackish; antennae, rather stout and long, tapering to base, serrate outwardly, with a short attenuate terminate hooklet. Thorax, above, bright green, becoming somewhat discolorous, tinged with ochreous, posteriorly. Basal segments of the abdomen, above, pale ochreous; third and fourth, entirely deep red; terminal segments olivaceous, shaded medially with deep red and distinctly marked laterally by patches of the same color; anal segment provided with an ample tuft; laterally, at base, a few pale ochreous hairs; beyond, on each side, the anal hairs are largely black, the longer scales from beneath fringe these black lateral portions of the tuft, which are also somewhat folded towards each other terminally; medially, the anal tuft is obscure reddish tipped with black. Beneath, the anal hairs, with the entire abdominal surface, are dull ferruginous or rusty red. The pre-anal segment shows medially a few white scales; laterally, longer, pale ochreous hairs converge inwardly from the margins of the segments. Anterior coxae, thickly clothed with pale yellow white hair, concolorous with under thoracic surface. Legs, slender, finely scaled; anterior femora, tibiae and tarsi, obscure pale ferruginous or red inwardly, outwardly pale yellowish white; middle femora and tibiae, entirely pale whitish, with a dark discolored dot at the joint above; tarsi, ferruginous, paler towards the base. Posterior legs with the femora and tibiae pale yellowish white; tarsi and base of the tibiae, dark ferruginous or red; tibial spines rather feeble, pale colored.

Anterior wings, narrow, much produced at apices, short along internal margin, dark claret brown, covered at base with bright green scales; discal cell narrow, brought near the base of the

Expanse (♂ and ♀), 1.65 to 1.70 inch. *Length of body*, 0.80 to 0.90 inch.

Habitat.—Atlantic District. (Buffalo, N. Y.!)

This species is closely allied to H. thysbe, *G. & R.*, from which it may at once be separated by its smaller size and the non-dentate inner margin of the terminal band of the primaries in the male. We have elsewhere drawn attention to the character afforded by the inner margin of the terminal band in H. thysbe; it is, however, in the males alone that it is prominently dentate on the interspaces. There are several other less striking characteristics which will at once separate H. buffaloensis from H. thysbe, on a comparison between specimens of either sex. From H. gracilis, *G. & R.*, the new species may be at once distinguished by the longer and narrower primaries, with the discal cell crossed longitudinally by a bar of scales; by the different color of the legs and under thoracic surface, and by the diaphanous space on the secondaries being crossed, as in H. thysbe, by six nervules.

Haemorrhagia buffaloensis has been frequently reared from the larva by collectors in Buffalo, N. Y. We figure a variety of the female, in which the usually wholly vitreous fields of the wings are sparsely and evenly clothed with scales. We have observed a similar variation in specimens of H. thysbe.

Haemorrhagia floridensis, n. s.

(Plate 16, fig. 20, ♂.)

♂. Size, large; form, stout. Head, above, dark olive green. Labial palpi, projected beyond the front, approximate at their tips; above, blackish; beneath, with under thoracic surface, clear yellowish white. Legs, generally finely scaled: anterior pair outwardly clothed with whitish scales; inwardly, the tegument is almost naked, blackish and dusted with ferruginous atoms. Middle pair with the femora clothed with yellowish white hair outwardly; inwardly, blackish, naked; tarsi shading to blackish towards the extremities. Hind tarsi and the basal portion of the tibial hairs, black; inwardly, the tarsi are obsoletely shaded with pale hairs. Thorax, above, entirely dark olive green, which color extends over the two basal segments of the abdomen above. Next four segments above, very deep red, fringed sparsely anteriorly by short white hairs which are easily removed by attrition, appressed. Fifth and sixth segments with olive green lateral shades. The fifth and sixth, and the anal segment, show yellowish-white sub-tufts at the sides. Anal tuft, reddish in the middle, where the hairs are longest; black at the sides; underneath, entirely bright red, where the hairs are more thinly spread out and shorter than above, allowing the lower black surface of the superior tuft to be seen. Under surface of abdomen, bright red; terminally a few yellowish white hairs, gathered on anal and pre-anal segments into small medial sub-tufts. Antennae, black, rather massive, gradually swelled to the tips, terminating in the usual extremely fine and reflected spinule; beneath, rugose or regularly serrated; above, smooth.

Anterior wings with the costa sub-sinuate, rounded at base, medially depressed, rising again to apices; external margin very oblique; internal angle prominent. At extreme base these are covered with olive green hairs; beyond, dark red; costa and inter-

and the base of the wing. Under surface of posterior wings, bright red, paler than upper surface; at extreme base some ochreous and yellowish white scales.

Expanse, ♂, 2.40 inch. *Length of body*, 1.40 inch.

Habitat.—Florida. (Melonville, Fla., "February"—Chas. Linden!)

Distinguishable from H. thysbe, by its stouter form, the edentate inner margin of the terminal band of the ♂ primaries, and by the differently colored feet.

H. fuscicaudis (*Sesia fusic.*, Walk.) is unknown to us, but we have examined a drawing of this species made under the superintendence of Mr. Walker, which shows it to be much nearer allied to H. thysbe than the present species, since it is slenderer and shows the inner margin of the terminal band of the ♂ primaries to be plainly dentate as in H. thysbe, while the absence of the olivaceous lateral shades on the terminal abdominal segments is the only prominent character which distinguishes Mr. Walker's Sesia fuscicaudis from Fabricius' species, to judge by the brief diagnosis of the former given in the British Museum Lists.

Family, ZYGAENIDAE.

SUB-FAMILY, ZYGAENINAE.

MELANCHROIA, *Hübner.*

Melanchroia regnatrix, n. s.

(Plate 16, fig. 15, ♂.)

♂ and ♀. Head, moderate, held on a line with the body, larger in the male, in which sex also the eyes are fuller and more prominent. Above, bright metallic blue; beneath, the small labial palpi are fulvous; maxillae, moderate, dull fulvous. Antennae, black, with a sub-cyaneous tinge on the stem above; plumose in the male, in which sex the pectinations are twice as long as in the female. Thorax, as usual, proportionally well developed, the disc globose; above, entirely brilliant metallic greenish blue; tegulae, fringed with longer and duller hairs. The metallic color of the thoracic parts extends over basal abdominal segment above. Beneath, the thoracic parts are entirely fulvous; the rather long and slender, cyaneous-black legs are covered with fulvous scales. Abdomen, rather slender and weak, not exceeding internal margin of secondaries in length, entirely fulvous; beneath, of a more yellow, less orange shade. The abdominal squamation is mealy and characteristic of the genus. The genital claspers, in the male, are fringed with longer hairs; in the female, the abdomen terminates more pointedly.

The wings are rather long and large; anterior wings well produced apically, above of a brilliant metallic greenish blue color with a changeable reflection, without markings. Along external margin, the metallic coloration becomes obsolete, leaving a narrow, even, terminal space of a dull black hue. The "veins" are obsoletely brought into relief by darker scales; fringes, blackish.

Posterior wings, rounded, of a dull black color, shaded medially with deep blue; the median and internal nervules are accompanied by diffuse, bright greenish blue shades extending from the base of here associated with one of the lower genera, which, although higher than Dioptis, still, by its weak body parts and especially by its slight abdomen and the mealy squamation of the latter, evinces a sensible degradation from the firm body crust and concentrated characters of the more typical genera of the Family. M. regnatrix, is the third Cuban species of the genus described; the two formerly known being M. fumosa, *Grote*, and M. geometroides, *Walker*. The analogies of Melanchroia with the Phalaenidae would be indicated by the name given to this latter species by Mr. Walker; these are, however, more truly taken from the Bombycidae.

Family, PHALAENIDAE.

ENNOMOS, *Treitschke*.

Ennomos Coloradaria, n. s.

(Plate 16, fig. 11, ♀.)

Eugonia coloradaria, G. & R. *MS.*

♀. Pale yellowish ochreous. Head, thorax, and legs, whitish ochreous; antennae simple, whitish; legs slight, hind tibiae with short spurs.

Anterior wings a little rounded along costal margin at base, depressed sub-apically; apices truncated; external margin broadly produced above the middle. External margin of secondaries broadly produced about the middle. Primaries pale ochre yellow, sparsely and irregularly irrorate with brown scales. A broad, arcuate, brownish black, transverse anterior band. A sub-obsolete discal spot. A very broad, prominent, angulated, blackish brown transverse posterior band, distinctly margined on either side. This is twice bent or angulated: first, immediately at costa; secondly, opposite the disc. A faint, whitish, diffuse, sub-terminal shade. Immediately below the apices, the external margin, which is here excavate, is edged with brownish scales. Secondaries, whitish ochreous, paler and more thinly scaled than primaries, tinged with a more purely ochreous shade along external margin before anal angle. The whole surface is sparsely irrorate; a faint median line crosses the wings, corresponding to the transverse line of primaries, but much weaker and fainter, composed of aggregated brown scales and becoming more distinct and linear before internal margin. Under surface, whitish ochreous, deeper stained along costal region of primaries and over the secondaries, coarsely and sparsely irrorate with brown scales. The transverse bands of the upper surface are here reflected.

Expanse, ♀, 1.50 inches.

Habitat.—Colorado Territory (Mr. Jas. Ridings).

Allied to the European E. tiliaria and E. angularia. Our specimen, though beautifully fresh, has the abdomen broken.

ENDROPIA, *Guenèe.*

Endropia arefactaria, n. s.

(Plate 15A, fig. 7, ♂.)

black dot. Terminal and sub-terminal spaces, shaded with reddish or ferruginous, sparsely speckled with black scales. Sub-terminal band, interrupted, broad, irregular, whitish ochreous, speckled with black scales, forming a distinct apical pale and broad mark, becoming obsolete at just before internal angle. Posterior wings resembling anterior; terminal space, outside of the median line, becoming diffusedly ochraceous inferiorly and over anal angle, ferruginous or reddish superiorly and along the median line. Median line, dark reddish, ferruginous, strongly marked and straight, resembling the transverse posterior line of primaries in appearance and color, but not strictly corresponding to it, since, when the wings are expanded, it does not match that of the primaries, or run continuous with it, but arises at a point on the costa of secondaries which is removed farther outwardly than the termination of the transverse posterior line of primaries on internal margin. Discal dot black, smaller than on anterior wings. A second, less distinct, inner transverse shade line, corresponding to the transverse anterior line of primaries and accompanied by rather numerous black speckles. The secondaries are almost entirely speckled with black, but more prominently so basally and along external margin, the dark space contiguous and outside of the median line being partially free from speckles. The median line is shortly geminate opposite the discal cell; this is more prominent beneath. Under surface, resembling but brighter than upper, paler, more prominently irrorate and with clusters of black speckles at base of both wings; discal dots distinct; secondaries entirely pale ochreous, except the transverse bands, which are more distinct than above. The transverse posterior line of primaries is followed by a broad reddish shade band, limited externally by the sub-terminal pale ochreous shade and by an undulating sub-obsolete series of black dots.

Expanse, ♂, 1.50 inch. *Length of body*, 0.70 inch.

Habitat.—Atlantic District. (Penn. to Maryland. !)

We have seen the female of this species, which resembles the male and is larger, but have no longer specimens before us. In size and general appearance this species resembles E.

aniliaria (*H. S.*), from Venezuela, but is at once distinguished by the shape of the external margin of the secondaries. A specimen of E. arefactaria, had been forwarded to Mr. Walker for comparison, who regarded it as a distinct species allied to the Floridian E. astylusaria, *Walk.*, a species unknown to us.

Endropia vinulentaria, n. s.

(Plate 15A, fig. 5, ♂.)

♂. Head, thorax, and abdomen, pale ochreous; antennae, finely bipectinate, the pectinations obsolete at tips. Wings, pale ochreous, evenly and improminently irrorate with darker scales than the ground color; outside of the transverse posterior and median lines, the entire terminal spaces are darker than the wings within them, being of an even purplish dove color. Primaries, pointedly produced at apices; external margin, rounded outwardly to internal angle, being roundedly produced medially without any prominent angulation. Secondaries, obliquely depressed at apices, below which is a wide and shallow excavation. Anterior wings, evenly pale ochreous from base to transverse posterior line, evenly dusted when the wings are expanded, it is seen to arise from a point on the costa of secondaries further removed outwardly than the point of termination of the latter line on internal margin of primaries. External margin, entirely and evenly darker colored than within the median line, similarly colored with the terminal spaces of primaries, and without any paler maculations or shadings. External edges of both wings dark. Under surface, clear pale ochreous, thickly irrorate with brown scales; the "veins" marked with brownish. Inner common lines composed of aggregated brown atoms, more distinctly marked on primaries. Distinct black discal dots. The transverse posterior line is S-shaped on primaries, dark brown and geminate centrally, since an even oblique narrow line leaves it below costa at its outward inflection, and connects with it again at its inward inflection at a point on the interspace between 3d and 4th m. nervules. Outside of the t. p. line, the external margin is dark colored as on upper surface, leaving a distinct apical mark pale ochreous. Secondaries, clear pale ochreous; a median S-shaped brown line corresponding to the t. p. line of primaries and geminate, since it is crossed at right angles by an even oblique narrow brown line, commencing on costa nearer the apex than the median line, which it crosses and again meets and is fused with below 3d m. nervule. Outside of median line, the wing is clear pale ochreous, not corresponding to the dark terminal space of the upper surface and to both surfaces of primaries. External margin edged with dark brown.

Expanse, ♂, 1.20 inch. *Length of body*, 0.50.

Habitat.—Atlantic District. (New York State!)

Of the size of E. amoenaria, *Guenèe*, but differently and paler colored; the apices are less produced than in Guenèe's representation of that species; there is no dark subterminal line with inferior pale spots annulated with black. The ornamentation of this species recalls that of Hyperitis amicaria, *Guenèe*.

Endropia vinosaria, n. s.

(Plate 15A, fig. 4, ♂.)

♂. Head, thorax, and abdomen, clear pale ochreous; antennae finely bi-pectinate; pectinations obsolete at tips.

Anterior wings, clear pale ochreous, irrorate with brownish scales. Transverse anterior line, brownish, irregular, inwardly excavate between costal and median nervures, projected superiorly, All the "veins" brought into relief by brownish scales. Discal dot, obsolete. Median space, clear pale ochreous. Transverse posterior line, irregular and geminate, since, opposite the disc, its outward projection is accompanied, within, by a second brown line, which runs more straightly obliquely and at variance with it at this place, leaving a pale ochreous space between the lines; above and below this the lines are fused. Outside of the t. p. line, the wing is washed with purplish brown, leaving a pale ochreous subterminal shade, which is broad and interrupted, being strongly marked at apex and again over the median nervules, and becoming obsolete towards internal margin. Secondaries, wholly pale ochreous; all the "veins" marked with brownish scales; coarsely irrorate with brown scales. An internal transverse line composed of aggregated

A larger species than E. vinulentaria, *nob.*; but resembling that species in general color and style of markings. The clear pale ochreous color of the wings above is not dusted with a faint obscure purplish shade; the subterminal ochreous shade band again appears, below the apices of the primaries, over the median nervules; the transverse lines are more irregular, distinctly geminate on both surfaces; the external border of secondaries is clear pale ochreous on both surfaces. E. vinosaria (♂) varies in the extent of the darker shades on external border of primaries.

Endropia textrinaria, n. s.

(Plate 15A, fig. 6, ♂.)

♂. Head, thorax, and abdomen, pale ochreous, shaded with reddish on thorax above. A broad, dark, frontal line, before the antennal insertion; palpi, dark brownish. Antennae, finely bipectinate; the pectinations becoming obsolete at tips.

Wings, broad; anterior pair, produced at apices, and more prominently so on external margin at extremity of second median nervule. External margin of secondaries, prominently produced and angulated centrally. Primaries, pale ochreous; all the "veins" are prominently marked with reddish scales. Basal space, pale ochreous, but so thickly irrorate with reddish and brownish scale streaks as to leave little of the ground color apparent. The reddish scales are aggregated along costa and form a shade coincident with the dark, slightly irregular and diffuse transverse anterior line. Median space, pale ochreous, coarsely irrorate with reddish and dark scale streaks, narrow, constricted at the sub-median fold by the approximation at this point of the median lines. A distinct, black, discal dot situate on the discal cross vein. Transverse posterior line, brownish, distinct, obliquely arcuate to sub-median fold, thence running straightly to internal margin, succeeded by a coincident reddish shade. Outside of the t. p. line, the external border is stained with reddish brown and washed with purplish; the dark portions are finely irrorate with black scales, leaving the pale ochreous ground color of the wing to spread as an irregular, broad, diffuse, apical shade extending obsoletely downwards over the median nervules. Secondaries, resembling primaries in appearance and coloration—pale ochreous, irrorate with reddish and brownish shade streaks and washed with a purplish shade. A distinct, small, black, discal dot; outside of this is a median, slightly sinuous line, corresponding to the t. p. line of primaries and resembling it in color and conformation; this line is inferiorly succeeded by an obscure, diffuse, reddish brown shade having a faint purplish reflection. An external, sub-obsolete line, regularly lunulate between the nervules and lost inferiorly in the reddish brown shade, which latter is somewhat interrupted centrally, but darkens the wing again very distinctly along external margin between the central angulation and anal agle. A corresponding line to this latter, is seen on the primaries, but it merely appears over the pale ochreous ground color of the wings which obtains, as a diffuse ochreous shade, over the apical portion of the wing. Under surface, resembling upper, pale ochreous; the median lines of the upper surface of primaries are here reproduced. A distinct, black, discal dot. The t. p. line is succeeded by a very distinct, brown, lunulate line, corresponding to its analogue of the upper surface, but here more

The abdomen, owing perhaps to the breadth of the wings, hardly extends as far as anal angle of secondaries.

DREPANODES, *Guenée.*

Drepanodes puber, n. s.

(Plate 15A, fig. 1, ♂.)

♂. Wings, pale fawn color, with an olivaceous shade, which latter obtains principally over the median space of the primaries and along the external margins of both pair. Primaries with the apices bluntly sub-falcate, but slightly produced. Immediately below the apex, the external margin is inwardly sinuate, thence rounded outwardly to internal angle, the latter improminent. Base of the wing, pale fawn color, limited externally by the first short transverse line, which latter is slightly arcuate, pale, indistinct, and margined outwardly by an olivaceous shade, most distinctly marked on costa. The median space is tinged with olivaceous. A black discal dot. Faint traces of a median shade. The costal region is sparsely irrorate with dark scales. The outer, long, oblique, transverse line, limiting outwardly the median space, is pale, *whitish*, more distinct than the first line, outwardly projected immediately below costa, thence running inwardly obliquely to internal margin and bordered inwardly by a faint darker olivaceous shade. Outside this line, the wing is pale fawn color and the olivaceous terminal space is limited inwardly by an arcuate faint pale shade, which runs from apex to internal angle, and, being inwardly arcuate, leaves the terminal space widest at about the middle, at which point are two distinct, superposed, dark clouded spots, situate just without the arcuated sub-terminal pale shade band. External margin lined with dark olivaceous; the extremities of the short fringes are whitish. Secondaries, resembling primaries in coloration. A straight, short, median, whitish line, distinctly margined inwardly by a coincident dark olivaceous shade. This line becomes obsolete at the costal region, which latter, from base to apex, is pale, discolorous with the rest of the wing. A minute, black, discal dot, situate on the lower confines of the pale costal space, which is here straightly limited. A faint, slightly tremulous, pale shade at anal angle, continued obsoletely to apex and analogous to the subterminal pale arcuate shade of the primaries, but not arcuate here, its course being comparatively straight.

Under surface, darker than upper, nearly concolorous on both wings, evenly irrorate with dark scales. The minute black discal dots are distinct on both wings. No markings, except a single very faint pale transverse common line. On the primaries, the region along internal margin is pale, discolorous with the rest of the wing, and analogous to the condition of the costal region of the upper surface of secondaries.

Head, thorax, abdomen, and legs, pale fawn color, concolorous with wings at base; antennae, pectinate; abdomen, very nearly as long as internal margin of secondaries.

Expanse, ♂, 1.30 inch. *Length of body*, 0.50 inch.

Habitat.—Atlantic District. (Penn. !)

The peculiar soft coloration, closely scaled wings, simple and distinct markings, and, in particular, the *pale* transverse lines, in conjunction with the blunted apices of the primaries, will sufficiently distinguish this pretty species.

what brighter shade than the wing elsewhere, but encroached upon by the dark shades which follow and precede the first and second transverse lines. Outer transverse line, distinct and broad, blackish, preceded by a diffuse brownish shade and followed by a faint linear pale shade, angulated acutely below costa. Apices, dark, washed with pale somewhat pruinose scales. Outside of the outer transverse line, the wing is colored as at base, sparsely irrorate, without nebulosities. External margin lined with reddish ochreous on both pair of wings. Secondaries resembling primaries in coloration and appearance, evenly irrorate. A distinct median line, analogous and corresponding with the transverse posterior line of primaries. A minute black discal dot, situate, as usual, on the lower margin of the pale costal region. The irrorations are somewhat transversely arranged, especially externally, outside of the transverse posterior and median lines. Under surface of both wings, a little darker, but of a similar color with upper surface, coarsely and evenly irrorate with black. Black discal dots, distinct. A narrow, rather faint, common, blackish line, analogous to the transverse posterior and median lines of the upper surface.

Expanse, ♀, 1.45 inch. *Length of body*, 0.50 inch.

Habitat.—Atlantic District. (Penna.!)

Drepanodes aquosus, n. s.

(Plate 15A, fig. 3, ♀.)

♀. Head and thorax, ochreous brownish; tegulae, obsoletely fringed with purplish hairs. Abdomen, pale ochreous brownish; under surface and legs, ochreous brownish, thickly sprinkled with black scales. Antennae simple. Anterior wings, ochreous brownish, coarsely irrorate and shaded with dark scales arranged in short transverse striate lines. Basal space, ochreous brownish, suffused outwardly by confused linear shadings, limited externally by the arcuate transverse anterior line, which latter is ochreous ferruginous, preceded by a pale shade line and a diffuse pale purplish shade. Median space, bright ochreous brownish, irrorate and frosted with pale scales so as to leave the costa and a central shade clear ochreous brownish. A small black discal dot, surrounded by a pale purplish shade, situate approximate to the t. a. line. Transverse posterior line, broad, distinct, dark ochreous brown, with an internal, narrow, whitish line, followed by a blackish shade. This internal narrow whitish line might be regarded as the t. p. line itself and described as preceded by a broad, distinct, even, dark ochreous brown shade band and followed by a blackish shade. The t. p. line, as usual, is dentatedly projected below costa, on which the whitish shade is a little diffuse. Apices blackish. Outside of the t. p. line, the external space is thickly irrorate and washed with a pale purplish shade. A whitish, irregular, sub-terminal shade band, very narrow at apices, and everywhere diffuse and indistinct. External margin, below the falcated apices, narrowly lined with bright ochreous ferruginous. The very short fringe is whitish. External margin, shaped much as in D. varus; apices falcated, below which the margin is evenly rounded to internal angle. Secondaries, resembling primaries in appearance and coloration. At base, ochreous brownish, transversely irrorate. A median line, corresponding to the t. p. line of anterior wings and similarly colored and constituted, but wanting the exterior blackish shade. Outside of the median line, the wide terminal space is washed with

Ellopia, *Treitschke.*

Ellopia bibularia, n. s.

(Plate 15A, fig. 8, ♂.)

♂. Wings, delicate, thinly scaled, pale testaceous grey, much clouded by darker irrorations which are composed of pale brownish or blackish scales gathered into short transverse streaks. Anterior wings with the external margin rounded, improminently exserted at the extremity of the second median nervule. A transverse anterior line, outwardly arcuate and slightly projected superiorly, preceded by an obsolete pale shade which is nothing but the ground color of the wing partially free from irrorations. A linear transverse discal mark. A transverse posterior line, roundedly and slightly outwardly projected at about first median nervule, and succeeded by a narrow pale coincident shade, analogous to that preceding the transverse anterior line. Sub-terminally, the wing is irregularly and partially free from irrorations; thus a pale transverse shade is formed, most prominent over second and third m. nervules. The transverse lines are pale blackish or brownish, and but little darker than the irrorations. Where the lines cross the "veins," these are longitudinally marked with darker scales. Secondaries, resembling primaries; a median dark line, corresponding to the transverse posterior line of the primaries and followed by a similar narrow pale coincident shade. Sub-terminally, as on the primaries, the wing is very partially and irregularly deprived of irrorations. External margin, rounded, with no perceptible angulation. Faint traces of a discal mark; this, like that on the primaries, is merely composed of an aggregation of the irrorations with which the wings are clouded. The short fringes are silky and concolorous with the wings. Under surface, clear greyish testaceous, without irrorations except obsoletely on costa and diffusely along external margins. There are no markings, the delicacy of the wings causing the marblings and lines of the upper surface to be faintly reflected.

Head, ochreous; antennae, finely plumose, antennal stalk, above, clothed partly with ochreous scales. Prothorax, ochreous; thorax, patagia, and abdomen, concolorous with the wings, but the latter is stained with ochreous laterally and beneath. Legs, testaceous; middle and fore tibiae and tarsi, brownish; hind tibiae with two pairs of rather short sub-equal spurs.

Expanse, ♂, 1.60 inch. *Length of body*, 0.60 inch.

♀. Resembles the male, but the ochreous caputal tinges are wanting. The color of the wings is more purely grey, wanting all testaceous tinges; the irrorations are less aggregated along the borders of the wings than in the opposite sex. The external margin of the anterior wings is less rounded and the angulation is more prominent than in the male. The external margins of the secondaries are slightly produced at the extremity of the second median nervule. Antennae, simple.

Expanse, ♀, 1.50 inch. *Length of body*, 0.60 inch.

Habitat.—Atlantic District. (Penna. !)

Larger than E. flegitiaria, *Guenée*, which it resembles rather than the common E. fiscellaria, *Guenée*, though of the size of this latter, from which it differs by its different color and less prominently angulated external margins of the wings.

color than the rest of the wing and not sharply defined, rather indistinct. The outer line is but slightly sinuous. An obsolete discal spot on the cross vein, hardly apparent. Secondaries resembling primaries, crossed by a median shade line corresponding to the transverse posterior line of anterior wings. The external margin improminently produced. Under surface resembling upper, and without markings, except that the ornamentation of the upper surface is reflected owing to the thinness of the wings.

Expanse, ♂, 1.60 inch. *Length of body*, 0.50 inch.

♀. Resembles the male, but is a little darker; the ordinary lines on the primaries are visibly more approximate; this is caused by the removal of the transverse anterior line nearer to the extremity of the discal cell. The angulations of the external margin are, as usual, more evident than in the opposite sex. The irrorations are rather more apparent along the external margin than in the male. Antennae simple.

Expanse, ♀, 1.50 inch. *Length of body*, 0.60 inch.

Habitat.—Atlantic District. (Penna. !)

Closely allied to E. bibularia, *nob.*, but distinguishable by the less prominent irrorations, the darker color, the more diffuse and improminent transverse lines, the different position of the first transverse line of the ♀ primaries, and by the peculiar pellucid appearance of the wings, which, while it has prompted the specific name, has reminded us of the Bombycid *Anisota pellucida.*

Ellopia endropiaria, n. s.

(Plate 15 A, fig. 10, ♀.)

♀. Head, thorax, and abdomen, pale whitish ochreous. Above, the thorax a little darker than elsewhere. Antennae, simple, and, with the legs, nearly concolorous with the body.

Wings, whitish ochreous, evenly sprinkled with pale ochreous irrorations. Anterior wings, produced at the apices and prominently projected at external marginal extremity of second median nervule. Three, narrow, faint, sub-parallel, transverse lines cross the wing, of which the outer, crossing the nervules, is the least distinctly defined. The middle line runs slightly obliquely from costa to internal margin, just beyond the discal cell, crossing the median nervure at about the point at which the second and third m. nervules are thrown off together. Posterior wings, resembling anterior, crossed by a distinct median line, the latter corresponding to the middle line of the primaries. An outer line, prominently angulated at the middle of the wing, arising on costa at a point about midway between the apex and the inception of the middle line, and joining internal margin at about the same point with the latter. Fringes, on both pair of wings, pale ochreous, a little darker than the wings. The external margin of the secondaries is prominently medially projected.

Under surface, a little paler than upper surface; the irrorations are obsolete; the two outer lines of the upper surface are here reproduced.

Expanse, ♀, 1.55 inch. *Length of body*, 0.50 inch.

nervule, and regarded as thrown off at the same point with the third m. nervule from the main nervure. From Mr. Walker's descriptions in this genus, none of the above described species of Ellopia can be properly referred as intended by the British Entomologist.

EUPITHECIA, *Curtis.*

Eupithecia geminata.

Larentia geminata, nobis, Proc. Ent. Soc. Phil., Vol. 6, p. 29, Plate 3, fig. 6, ♂ (May, 1866).

Eupithecia anguilineata, n. s.

(Plate 16, fig. 12, ♂.)

♂. Head, greenish white; a narrow black frontal line before antennal insertion; antennae, simple, blackish, finely closely and regularly sub-annulate with whitish. Thorax, above, greenish; latterly, the tegulae are distinctly marked with black. Abdomen, cinereous, as long as internal margin of secondaries, with superior blackish segmentary linear marks. Labial palpi, black at the tips, whitish beneath. Under thoracic and abdominal parts, whitish cinereous. Legs, cinereous; tibiae and tarsi, black, constrictedly sub-annulate with whitish.

Anterior wings, whitish, everywhere prominently shaded with green of an olivaceous tinge, and with black and powdery markings. At extreme base, a black nervular mark. A broken, narrow, black, transverse basal line, succeeded by a broad distinct olivaceous green shade, in turn followed by a powdery band of black scales, more distinct on costa and hardly attaining internal margin and which precedes an excavate, narrow, black, transverse anterior line, the latter obsolete before internal margin. Median space with a distinct anterior greenish transverse shade, which fuses, on internal margin, with the first distinct similarly colored transverse shade. A narrow median black line, marked by black dots on the "veins," and apt to become obsolete on the disc and superiorly; below the median nervure this forms a more or less evident

Transverse posterior line, distinct, black, regularly sinuate or S-shaped, preceded on the disc by a black discal dash, and followed rather broadly inferiorly, by a black powdery shade. Costa dotted with black. Sub-terminally are one or two greenish olivaceous transverse shade bands. Sub-terminal line, geminate, narrow, blackish, powdery, twice very broadly marked opposite the disc. Terminally, the wing is shaded with olivaceous and, inferiorly, with powdery blackish on the interspaces. A very distinct and neat series of black points arranged in pairs at the extremity of the nervules. Fringes, greyish. Under surface, cinereous; "veins" somewhat darker marked; no markings, except a discal dot, and that the thinness of the squamation allows some of the markings of the upper surface to be perceived.

Posterior wings, pale cinereous; a darker terminal shade, within which are traces of two cinereous lines; a slight discal dot on the cross vein. Beneath, clear pale cinereous; a distinct discal dot on the cross vein; outside of disc are traces of two cinereous bands, the outer of which is indicated by darker scales on the nervules; terminally, shaded with darker cinereous.

♀. Resembles the ♂; the secondaries are darker cinereous and nearly unicolorous; a narrow terminal dark line.

Anterior wings, whitish, with transverse wavy or dentate bluish green shade bands of unequal width. Base, bluish green, with a basal brownish sinuate line not attaining internal margin. The basal bluish green space is outwardly limited by a narrow sinuate brown line accompanied by ochraceous powdery scales. An antemedian whitish space, traversed medially by a dentate, bluish green, transverse shade. A concise, darker margined, median bluish green shade band, excavate along the edges, produced outwardly below the discal cell and margined inwardly by a transverse deep brown line accompanied by ochreous scales and more distinctly marked on costa. This median band is margined outwardly by an irregular line of a deeper bluish green hue than the band itself and marked with brownish on costa. A distinct black discal mark. A post-median, transverse, whitish band, analogous to its ante-median predecessor, but more distinct and prominent, traversed medially by a narrow dentate bluish green shade band, bent outwardly opposite to the outward projection of the median band, which influences its shape. Outwardly limiting this whitish band, is a deep brown line accompanied by ochreous powdery scales, rather irregular and partially obsolete. Beyond this, the wing is again bluish green with a whitish, narrow, sub-terminal line, prominently zigzag below costa and followed and preceded by brown scales which appear at irregular intervals, and accompanied, as usual, by powdery ochreous scales. A terminal, distinct, black, marginal line, broken into geminate points at the extremity of the nervules, where, also, the fringe, which is elsewhere whitish, is interrupted with blackish. Under surface, testaceous, without prominent markings and suffused with a reddish shade; a discal dot; costal dots; base of the wings, dark, reflecting the bluish green shades of the upper surface; terminally, two outwardly oblique, discontinued, parallel, dark shade lines.

Posterior wings, cinereous, with a faint reddish tinge, immaculate; a broken, narrow, distinct, terminal black line along external margin; fringe, pale cinereous. Under surface, more prominently ruddy; a black discal dot and narrow terminal line; fringes, dotted with black at extremity of nervules, where the black terminal line is interrupted.

Expanse, ♀, 1.00 inch. *Length of body*, 0.40 inch.

Habitat.—Atlantic District. (Buffalo, N. Y. !)

Cidaria atricolorata, n. s.

(Plate 16, fig. 14, ♂.)

Lygris atricolorata, G. & R., MS.
Eustroma atricolorata, " "
Larentia atricolorata, " "

♂ and ♀. Front, black, with pale olivaceous whitish scales margining the eyes. Palpi, pale obscure olivaceous; second joint blackish outwardly. Head, behind, pale, with a black spot on vertex between the antennae. Thoracic disc with a median, very narrow, pale line. Tegulae, black, margined inwardly by pale lines meeting in front. Abdomen, above, black, with a median, longitudinal, very narrow, pale line; segments edged posteriorly with pale scales. Beneath, obscure dirty olivaceous, mixed with blackish; tarsi and tibiae, sub-annulate.

Anterior wings, deep velvety black. Black at base; a narrow pale sub-basal line directed obliquely outwardly, angulated on interminal line emerges from apex and runs inwardly obliquely until opposite the disc, where it is joined by a white line intersecting the sub-terminal black space superiorly. After this fusion, the subterminal line is outwardly lunulate twice between the m. nervules, running straightly over the interspace above internal nervure, where it terminates, accompanied inwardly by double lunules on this last interspace. Terminally, the wing is black; the second to fourth m. nervules are marked and accompanied by olivaceous scales. An even, pale, terminal line, bordered outwardly by a very narrow black line, lies directly on external margin; fringes, olivaceous cinereous, darker at base, obsoletely interrupted with blackish at extremity of nervules.

Posterior wings, blackish cinereous; a median sinuate line, shaded outwardly with pale scales and more distinctly marked towards internal margin; a sub-terminal white line, slightly lunulate on the interspaces inferiorly; the second to fourth m. nervules marked and accompanied by olivaceous scales. A terminal, even, pale line, followed by a narrow black line, as on primaries; fringes, olivaceous cinereous, darker at base, obsoletely interrupted with blackish at extremity of nervules.

Under surface, blackish cinereous; wings, at base, closely powdered with obscure ochreous olivaceous scales. An angulated, dark, post-discal line crosses both wings; this is followed on primaries by a coincident ochreous shade, obsolete inferiorly below the angulation. A distinct, sub-terminal series of interspaceal ochreous spots crosses both wings. Black discal spots, most distinct on secondaries.

Expanse, ♂ and ♀, 1.45 inch. *Length of body*, 0.50 inch.

Habitat.—Atlantic District. (Mass.! to Va.!)

This superb species varies, as noted in the body of the description, in the constriction of the black median space, owing to the course of the pale median lines below the median nervure. C. atricolorata, *nobis*, is allied to and congeneric with, the European C. prunata. Dr. Herrich-Schaeffer, rejecting Cidaria, would include the species under Larentia. Lederer has adopted Hübner's genus Lygris for this and congeneric species.

Family, PYRALIDAE.

PANTOGRAPHA, *Lederer.*

Pantographa limata, n. s.

(Plate 16, figs. 16, ♂ , 17, ♀.)

♂ and ♀. Head, yellowish white; labial palpi, twice marked with blackish externally. "Collar," yellowish, with two superlateral brownish linear marks; tegulae, yellowish, edged with brownish hairs. Abdomen, above, whitish, stained with yellowish; second and pre-anal segments marked across with brownish. In the male, the intervening segments are also shaded with brownish, while the abdomen is more tapering, slenderer, and longer than in the opposite sex. Beneath, the body parts are silvery white; anterior legs marked with blackish on the femora outwardly, while the tarsi and short tibiae are constrictedly annulate with black.

Anterior wings, pale yellowish testaceous, with a slight purplish hyaline reflection, particularly observable in the male, and much oblique, brown line, is quite distinct from costa to the dark shade in which it becomes lost. A lunulate sub-terminal line arises near the costa and becomes likewise lost inferiorly in the terminal dark shade. A narrow linear dark shade along external margin; fringes, silky, clouded. Posterior wings, yellowish testaceous, largely and evenly washed with a dark shade which is limited by the whitish color of the costal region, fading outwardly, where the wing becomes yellowish. A discal annulate mark, below which a second, whitish and unencircled. A single geminate dentate brown median line crosses the wing, running suddenly inwardly before internal margin. A narrow dark line rests on the external edge; fringes as on primaries.

Under surface, whitish, with a faint hyaline reflection and obsolete dark broken markings, reproducing certain of the lines and spots of the upper surface.

Expanse, ♂ and ♀, 1.60. *Length of body*, ♂, 0.70, ♀, 0.60 inch.

Habitat.—Atlantic District. (Mass. ! to Va. !)

Represents the Brazilian Pantographa scripturalis, *Lederer*, in our fauna. P. limata, is much larger, and may be at once distinguished by the different markings of the secondaries, which want the internal lines and are more evenly colored. The external margin of both wings appears to be more evenly rounded and less sinuate in either sex of our species. We are indebted to W. H. Edwards, Esq., for a number of specimens of this species taken in Kanawha Co., West Virginia, in which locality the species is of common occurrence.

Explanations of Plates 15*A* *and* 16.

FIG.

1, ♂ Drepanodes puber.
2, ♀ Drepanodes varus.
3, ♀ Drepanodes aquosus.
4, ♂ Endropia vinosaria.
5, ♂ Endropia vinulentaria.

6, ♂ Endropia textrinaria.
7, ♂ Endropia arefactaria.
8, ♂ Ellopia bibularia.
9, ♀ Ellopia pellucidaria.
10, ♀ Ellopia endropiaria.
11, ♀ Ennomos coloradaria.
12, ♂ Eupithecia anguilineata.
13, ♀ Cidaria cumatilis.
14, ♂ Cidaria atricolorata.
15, ♂ Melanchroia regnatrix.
16, ♂ Pantographa limata.
17, ♀ Pantographa limata.
18, ♂ Haemorrhagia buffaloensis.
19, ♀ Haemorrhagia buffaloensis.
20, ♂ Haemorrhagia floridensis.

XLVI.—*Descriptions of New Species of American Birds.*

BY GEO. N. LAWRENCE.

Remarks.—It comes nearest to *E. violacea*, but is smaller, and the upper plumage is entirely of a violet purple, most like the color which prevails on the hind neck only of that species, but of a deeper and redder tint.

2. Buarremon flavovirens.

Entire upper plumage, including the tail, of a clear yellowish green; the inner webs of the quill-feathers are blackish brown; under-plumage of a greenish yellow, deeper in color on the chin; bill blackish horn color, the under mandible whitish at base; legs dark brown.

Length 6 in.; wing 3⅜; tail 2¾; bill ½; tarsi ¾.

Habitat.—Ecuador.

Remarks.—In its almost entire uniformity of color, this species seems to differ from all others of the genus.

3. Pytilus (Caryothraustes) humeralis.

Top of the head and hind neck dark plumbeous, the upper plumage besides, of a clear yellowish green; tail and quill-feathers brownish black, with their margins similar in color to the back; the shoulder and the smaller wing coverts are bright yellow; outer edge of wing and under wing coverts paler yellow; chin, upper part and sides of the throat, grayish white, each feather with a narrow terminal band of black; ear coverts blackish; entire under-plumage of a clear grayish plumbeous, washed on the sides with yellowish green; crissum bright yellow; under mandible grayish horn color, except along the edges and at the point, where it is black, of which color also is the upper mandible; feet black.

Length about 7 in.; wing 3⅝; tail 3⅛; tarsi ¾.

Habitat.—New Granada, St. Fé de Bogota.

Remarks.—In distribution of colors, this does not resemble any other species with which I am acquainted; its dimensions are much like those of *P. poliogaster*, and the bill is of about the same size as in that species, but a trifle smaller.

4. Philydor virgatus.

The feathers of the head above, hind neck and back, and also of the sides of the head and of the neck, are blackish brown, with a clear ochreous stripe down the centre of each, the lower part of the back is of a dull rusty olivaceous brown, the upper tail coverts deep reddish cinnamon; the tail deep cinnamon, not so bright as the coverts; the wings are dull cinnamon brown, with the inner webs of the primaries, and the ends of the secondaries brownish black; the under wing coverts, and inner margins of quills light cinnamon; the chin and throat are pale fawn color, with faint brownish edgings to the feathers, on the lower part of the throat the feathers are of a light brownish color, striped down their centres with pale fawn; on the breast the feathers are of a deeper fawn color with dusky edges; the abdomen, sides and under tail coverts are of an olivaceous brown, lighter than the lower part of the back, with rather indistinct paler centres to the feathers; bill grayish white; the tail is black, marked with ten narrow white bars on each web, reaching almost to the shaft; the outer webs of the quills are black with white spots, the inner webs are smoky black with grayish white bars; some of the outer primaries and most of the secondaries have their outer webs bright rufous, which probably is an indication that the specimen is not quite adult; upper mandible black, the under dark horn color; feet black.

Length $6\frac{1}{2}$ in.; wing $3\frac{3}{16}$; tail $2\frac{1}{16}$; bill $\frac{9}{16}$; tarsi $\frac{7}{8}$.

Habitat.—Ecuador, Napo River.

Remarks.—This species belongs to the group represented by *T. doliatus*, but I think is quite distinct from that and all its allies. The transverse lines are narrow, and more clearly defined than in any of the others.

6. Thamnophilus nigrescens.

Male. Intense black, the feathers of the crest largely white at the base, it is marked both above and below with rather narrow transverse white bars, the throat and sides of the head have longitudinal white markings, these are quite small on the cheeks; the quill-feathers and tail are black, marked with roundish white spots, six pairs are on every feather of the latter, occupying each web; bill and feet black.

Length 6 in.; wing $2\frac{7}{8}$; tail $2\frac{3}{8}$; tarsi 1; bill $\frac{3}{4}$.

The female closely resembles those of the allied species, but is of a darker rufous below.

Habitat.—Venezuela.

Remarks.—Two specimens of the male and one of the female, were placed in my hands for examination by my friend Mr. John Cassin.

This species also belongs to the same group as the preceding, but strikingly differs in its much blacker appearance, without the grayish character which prevails in the under-plumage of its allies.

7. Myiodynastes superciliaris.

Male. Upper plumage greenish olive, the crest gamboge yellow, the front, sides of the crown, and ends of the yellow crest feathers dusky olive, the front mixed with grayish white; a broad superciliary white stripe runs from the bill to the hind head; the lores and sides of the head black, adjoining the throat dusky olive; there is a short white stripe on the side of the head, under the ear coverts; the upper tail coverts are of a darker olive than the back, and edged with ferruginous; tail brown with light rufous margins to the feathers; entire under plumage gamboge yellow, except the chin, which is grayish white; the wing coverts olive brown, the primary and secondary quills blackish brown, margined narrowly with ferruginous, the tertiaries are edged with yellowish white; under wing coverts yellow, inner margins of quills salmon color; bill and feet black.

Length 9 in.; wing $4\frac{1}{4}$; tail $3\frac{5}{8}$; bill $\frac{13}{16}$; tarsi $\frac{3}{4}$.

mixed with dull rufous; the tail is of a rich bronzed olive, with the bases of the feathers under the coverts, and the inner margins of the inner webs, nearly to their ends, cinnamon; wings bronzed olive brown, the primaries purplish at their ends, the outer web of the first primary and the under wing coverts cinnamon; upper part of throat, sides of the head and of the throat brown; lores and a narrow line over the eye dull cinnamon; neck in front and upper part of breast rather light cinnamon; breast and abdomen dark brown, the elongated feathers on the former ending with light cinnamon, the abdomen is intermixed with dull cinnamon; under tail coverts pale cinnamon; bill black, with the base of the under mandible yellowish; feet blackish brown, the soles pale yellow.

Length $4\frac{3}{4}$ in.; wing $3\frac{1}{8}$; tail $2\frac{1}{16}$; bill $\frac{11}{16}$.

Habitat.—Peru.

Type specimen in Mus. Smith. Institution, No. 39,931.

Two specimens examined were in a collection of birds made in Peru, by Walter S. Church, Esq., of New York, and presented to the Smith. Inst. One was obtained at Matara, Department of Ayacucha, the other at Moyabamba, Department of Cuzco.

Remarks.—This does not appear to resemble closely any others of the genus; the brilliant colors on the rump are much the same as in *A. cupreipennis* and *A. æquatorialis*, but darker, the only cinnamon color at all conspicuous, is a patch on the neck in front, whereas *cupreipennis* and *æquatorialis*, also *parvula* and *caumatomata*, have the entire under surface bright cinnamon; it likewise differs from all these in the color of the tail, in which no cinnamon shows, except just at the base and on the inner edges of the feathers for three-quarters their length, while in the species above named, the whole of the inner webs of the tail-feathers (except the two central) are of this color; the other two members of this genus, *A. Pamela* and *A. Castelnaudi*, have the body brownish black, with the lengthened feathers on the chest white, one has the rump green and the other purple, both have considerable cinnamon color in their tails.

The one now described, can readily be distinguished from all, by its olive-colored tail.

9. Heliomaster spectabilis.

The crown is of a dull brown without lustre, remainder of upper plumage of a shining dark grass green; central tail-feathers of a dark rather dull bronzy green, the others greenish at base with a broad subterminal black bar, and the ends grayish white, this last color most in extent on the outer feathers; the smaller and middle wing coverts colored like the back, the larger coverts dull purple, the quills purplish brown; the entire under plumage is of a dull grayish brown color, with an ochreous tinge; sides dull green with a white pleural spot; under tail coverts dull green, with grayish margins; bill black; feet pale yellow.

Length 5⅝ in.; wing 3; tail 1⅞; bill 1½.

by Alfred C. Garsia, Esq., Consul for the Republic of Costa Rica at Boston, who kindly permitted me to take it from the collection, together with some other species I desired to possess.

10. Passerculus guttatus.

Male. The plumage above is of a dull grayish brown, the centres of the feathers blackish; a stripe of pale yellow runs from the bill to the eye, a longer stripe of pale yellow extends from the under mandible down the side of the throat, the throat is white, and is separated from the yellow stripe by a line of dark brown spots; tail and wings umber brown, the latter margined with dull pale fulvous; breast, upper part of abdomen, and sides, conspicuously marked with elongated spots of dark brown, the lower part of the abdomen white; the under tail coverts white, sparingly streaked with brown; bill dusky yellow, the culmen dark brown; "iris dark brown, legs pale brown."

"Length 5.15; wing 2.60;" tail 2; tarsi $\frac{13}{16}$.

Habitat.—Lower California, San José. Collected by John Xantus, December, 1859.

Spec. in Mus. Smith. Ins. No. 26,615.

Remarks.—In the size and form of its bill only, this species resembles *P. rostratus*, above it is very much darker, and differs from all its allies in the obscure grayish coloring of these parts with no reddish brown, and in having its under plumage more closely and fully spotted.

11. Zonotrichia melanotis.

Male. A line of grayish white runs through the centre of the crown, from the base of the upper mandible to the hind neck, narrow on the front and becoming wider behind; this is bordered on each side by a broad band of black, extending from the bill over the crown and hind neck; along the edge of the crown on each side, a broad grayish white band runs from the upper mandible over the eye to the hind neck; adjoining, a wide band of black extends on each side of the head, from the bill through the middle of and below the eye, including the ear coverts; feathers of the hind neck ashy gray, with blackish brown centres, the feathers of the back are of a rather bright rufous, with lighter edges, and each marked down the centre with an elongated spot of blackish brown, lower part of back and rump light brownish rufous; upper tail coverts of the same color as the rump, but with dark centres and pale margins; under plumage grayish white, sides of the lower part of the neck and of the upper part of the breast cinereous, a lighter shade of this color extending across the lower part of the neck, the sides, lower abdomen, and under tail coverts washed with pale rufous; the tail is of a reddish brown, with pale narrow margins; the wing coverts are colored like the back; the quills are dark brown, the primaries with pale rufous gray edgings, the secondaries with dull rufous, and the tertiaries with broad margins of bright rufous; upper mandible black, the under yellowish white with the tip dusky; "iris brown;" legs yellowish.

Length (fresh) 7 in.; wing 3; tail 3¼; tarsi 15½–16.

on the breast, sides and under tail coverts, middle of abdomen white; the upper mandible is hazel brown above, the under mandible and the cutting edges of the upper, dusky yellowish white; "iris brown;" legs dull orange yellow.

Length (fresh). $5\frac{1}{2}$ in.; wing $2\frac{3}{4}$; tail $2\frac{1}{2}$; tarsi $\frac{7}{8}$.

Habitat.—Western Mexico, Plains of Colima.

Collected by John Xantus, June, 1863.

Specimen in Mus. Smith. Inst. Type, No. 31,825.

Remarks.—This is a Northern form of *C. manimbe* and *C. peruanus*, in colors it most resembles the former; in *C. peruanus* the coloring is darker and clearer than in either of them, the yellow on the edge of the wing and of the spot in front of the eye, being particularly bright; the new species is much the largest, both the wing and tail being fully half an inch longer, it is also without the yellow spot before the eye, existing in the other two.

13. Hadrostomus albiventris.

Male. Front and lores grayish brown, rest of crown and hind neck black, forming a distinct cap, remainder of upper plumage of a rather light bluish cinereous; sides of the neck and a not very distinct cervical band ashy gray; tail bluish cinereous, a little darker than the back, with very narrow paler edges to the feathers; quills blackish brown, with grayish margins; under wing coverts white, axillars with a pale ochreous tinge; under plumage grayish white, nearly pure on the chin, abdomen and under tail coverts, ashy on the breast and sides, with a rose-colored spot on the throat; bill plumbeous black, whitish at the end; legs dark plumbeous.

Length (fresh) $6\frac{1}{2}$ in.; wing $3\frac{5}{8}$; tail $2\frac{7}{8}$; tarsi $\frac{13}{16}$.

The female has the crown marked as in the male, but it is lighter, being of a dull ashy black; back and smaller wing coverts olive brown, with a rufous tinge; a distinct nuchal collar of pale rufous; tail brownish rufous, with brighter rufous margins; wings blackish brown, edged with rufous; middle and larger wing coverts rufous; inside of wings pale cinnamon; under surface grayish white, washed with pale cinnamon, darker on the sides and somewhat dusky on the breast.

Habitat.—Western Mexico, Plains of Colima.

Collected by John Xantus, January, 1863.

Types in Mus. Smith. Ins., No. of ♂, 29,402, of ♀, 30,126.

Remarks.—This differs from the allied species in the much lighter character of its plumage, both above and underneath, the rose color on the neck in front is of a lighter shade than in *H. affinis*, and more restricted.

14. Ortyx graysoni.

Male. Front, lores, a broad superciliary stripe extending to the hind neck, sides of the head and entire throat pure white; a line of black extends back from the eye, and encircles the white of the cheeks and of the lower part of the throat, forming a narrow collar across the breast; the entire under plumage besides is of a bright

Collected by Col. A. J. Grayson. No. of type, 42,562.

Remarks. — This Partridge, in its general appearance, resembles *O. pectoralis*, but is rather larger, it specially differs from that species, in there being no black before the eye, and in having a narrow black collar below the white throat, instead of a large black patch extending on the breast as in *O. pectoralis.* I consider it but a well-merited compliment to name it after its discoverer, who continues his explorations at localities seldom visited.

15. **Saltator plumbiceps,** Baird, MS.

"Male. Upper plumage grayish olive, the head above and at the sides cinereous; tail olivaceous; quills dark brown edged with ashy gray; beneath whitish, tinged with gray or brownish gray on jugulum and breast, passing behind on the remaining under parts into pale fulvous, of which color also are the axillaries; superciliary line reaching to the nape, bend of the wing and broad throat stripe white, the latter margined with a black line and above this a light gray one; irides reddish; bill and feet dark brown.

"Length 8 in.; wing 4.; tail 3.75; bill from nostrils .56, commissure .90; tarsus 1.06.

"*Habitat.*—Mexico, Mazatlan. Collected by J. Xantus, 1863. No. of type, 29,372.

"This species, as far as I can ascertain, is undescribed, and is interesting as being the most northern representative of the genus yet discovered. It approaches the *Saltator rufiventris* of Vigors (*S. vigorsii* of Gray, and, perhaps, of Bonaparte, Notes Ornith. 23), and considered perhaps justly to be a synonym of *S. grandis*, but appears to be lighter below, the abdomen and crissum by no means rufous, and the superciliary stripe extending far beyond the eye; it resembles typical specimen of *grandis* in the absence of clear olivaceous on the back and wings; it is, however, much paler beneath, the head lighter, the black stripe bordering the throat narrow, and with a light line above it; although the wings are longer, the bill is smaller, narrower, and much less tumid."

Remarks.—In the color of the back this species is much like *S. grandis*, but is of a lighter olive, the latter species has the sides of the head brownish black, the black border to the throat much wider, and the under surface very much darker; the new species in its under plumage resembles somewhat *S. olivascens*, but the colors are paler, less cinereous, and the tinge of fulvous more diffused.

16. **Pheucticus tibialis**, Baird, MS.

This species has the head, hind neck, lower part of the back, rump and entire under plumage of a deep golden yellow, with a clouded appearance on the throat and upper part of the breast, caused by the feathers underneath being banded with black, below which black band there is a yellowish white one on each feather, the thighs are black; a broad belt across the middle of the back, the tail and wings lustrous black; the upper tail coverts are black is black in the new species, and yellow in the other; the tail is immaculate, and the only white on the wing, is a spot at the base of the primaries; *chrysogaster* has large white patches on the tail-feathers; and the ends of the wing coverts, of the secondaries and of the tertiaries, are largely marked with white.

17. **Spermophila atriceps**, Baird, MS.

"Male. Head above and at the sides, upper part of back, with a pectoral collar, black; middle part of back, upper tail coverts and exposed portion of wings and outer edges of tail, grayish brown, with a tinge of olive; lower back and rump, with the under parts (interrupted by the black collar) light cinnamon brown, chin and throat paler; sides of the neck white, almost meeting behind and confluent with the color of the throat; primaries, except the outer three, white at the base, forming a speculum, and edged with ashy gray; inside of wing white; iris brown; bill and legs blackish.

"Length 4.50; wing 2.15; tail 2; tarsus .60.

"*Habitat.*—Mexico, Mazatlan. Collected by Col. A. J. Grayson. No. of type, 34,035.

"The black of the head extends on the nape and on the upper part of the back, behind the line of the white interrupted neck collar, and is continuous with the black pectoral band, this is much widened on the sides of the breast, but narrow in front; the quills and tail-feathers are dark brown, edged as described; the speculum is the only white on the wing.

"The female is uniformly light brownish olive above, yellowish cinnamon beneath, the middle of the belly lighter; the breast tinged with olive; the white speculum barely appreciable.

"This species has much resemblance to *S. torqueola*, in this however the whole back, as well as the wings and tail, is black, the latter with no edging except an almost unappreciable one of brownish; the white speculum is smaller, the cinnamon color is more extended on the rump."

Remarks.—Since the above was written many specimens have been received at the Smith. Inst., most of them have the back entirely olivaceous, without any mixture of black. These I consider to be not fully mature; in all other respects, however, they agree with the type. As stated by Prof. Baird *S. torqueola* has the back of a uniform black down to the cinnamon color on the rump, without any olivaceous color intervening as it does in the new species.

18. **Pyrgisoma xantusii**, Baird, MS.

"Male. Top of head and its sides behind the ear coverts, with the nape chestnut; rest of upper parts including wing and tail, forehead, cheeks and sides of body dark dull olive; beneath, from bill to anus, white; flanks behind and under tail coverts light cinnamon brown; edge of wing, ring round the eye and a loral spot, white; a somewhat concealed spot in the middle of the breast dark ashy olive; bill black; feet light brown.

"*Pyrgisoma kieneri* Bp. Conspectus, 486, differs in being larger than *biarcuatum*, with stouter bill, instead of being of much the same form, the cheeks are said to be immaculate rufous, not olive; and having a black pectoral spot.

"This bird appears strictly congeneric with *Pyrgisoma biarcuatum* and little if any different from *Pipilo chlorura; Atlapetes* is also very similar in general appearance; I am not at present prepared, however, to attempt any critical investigation of the true generic character of these species."

Remarks.—Since Prof. Baird's notes were written many specimens of *P. kieneri* have been received at the Smith. Inst.; these are not larger than *biarcuatum*, as described by Bon. but smaller, as stated by Mr. Cassin, Proc. Phil. Acad. 1865, p. 169, who considers it "clearly distinct from *P. biarcuatum*," not identical with that species as given by Mr. Cabanis, J. f. O., 1860, p. 412. Unfortunately I have no specimen of *biarcuatum* with which to compare, but Prof. Baird says *Xantusi* and that species are similar in size, viz. 7¼ in., whereas *kieneri* measures fresh but 6½ in., the ear coverts differ in all, being white in *biarcuatum*, rufous in *kieneri*, and olive gray in *xantusi; biarcuatum* is said to have the breast spotless, while *kieneri* has a broad lunate black band across the breast, and *xantusi* has only a small partly concealed pectoral spot.

Several specimens of *Melozone leucotis*, Cab., are before me; these are so different in markings that no comparison with that species is necessary; this Mr. Cabanis considers congeneric with *biarcuatum*, putting both in *Melozone*, but Mr. Cassin says, in his opinion, it is not of the same genus as *biarcuatum* and *kieneri*.

19. **Dendrornis mentalis**, Baird, MS.

"This species has a very close resemblance to *D. eburneirostris* in the reddish brown wings, tail and rump, the central brownish yellow shaft streaks of the feathers of back and belly becoming shorter and more oval on the upper part of head and neck, and still wider on the breast; the feet, however, are larger, and the tarsus shorter, so that the former exceed the latter, while in *eburneirostris* the tarsus is longer than or at least nearly equal to the middle toe and claw; the shade of reddish brown on wings and tail is lighter, the shafts of tail-feathers are light yellowish rufous, instead of very dark reddish brown; the chin and upper part of the throat in *eburneirostris* are uniform clear buff yellow, in the new species these parts are lighter in color, and the feathers are margined with brown, as are those also on the lower part of the throat; the yellowish of the shaft streaks in the head and back is much paler; bill pale horn color, clouded; iris red; legs dark brown.

"Length 9.25; wing 4.34; tail 3.90; bill above 1.70, from nostril 1.28, gape 1.67; tarsus .88; middle toe and claw 1.00, middle toe alone .70.

"*Habitat.*—Mexico, Mazatlan. Collected by J. Xantus. No. of type, 23,859.

"Four specimens compared with alike number of *eburneirostris*, show the peculiarities above referred to, in the pale

XLVII.—*Descriptions of New Species of Trochilidæ.*

By George N. Lawrence.

Read 27th May, 1867.

Doricha bryantæ.

Male. Entire upper plumage of a rather dull grass green; tail brownish black, tinged with purple, the feathers, except the central ones, having their inner webs broadly margined with dull pale rufous; chin and throat bright crimson, below which is a broad belt of grayish white; breast and sides dull green, intermixed with ashy, lower part of abdomen bright rufous, thighs brown, crissum light rufous, the feathers with dull green centres; wings dark brownish purple; bill black; " iris dark brown;" feet dark brown.

Length (fresh) 4 in.; wing $1\frac{1}{16}$; tail $1\frac{1}{2}$; bill $\frac{8\frac{1}{2}}{16}$.

Habitat.—Costa Rica.

Collected by Julian Carmiol, Feb. 27, 1867.

Specimens in Mus. Smith. Institution.

Remarks.—Of this beautiful genus, three other species only were previously known, found severally in the Bahamas, Eastern Mexico, and Guatemala. The one now described, is most like *D. evelynæ*, from the Bahamas, in the form of its bill and tail-feathers, but the former is rather longer and the latter much narrower in the new species; it differs in the duller and darker green of the upper plumage, in the throat being uniform in color, not changeable, and with no approach to violet or purple; there is less rufous below, and the margins of the tail feathers are pale, and occupy half the web, while in *evelynæ* the entire inner webs of the tail feathers are bright cinnamon.

In *elizæ*, from Mexico, the color of the throat changes to bluish violet, and is more brilliant, with the plumage above and of the breast golden; the bill longer and curved, and the feathers of the tail broader at their ends than at base, instead of being obtusely pointed. *D. enicura*, from Guatemala, is so different from the others that no comparison need be made. In the specimens of *D. bryantæ* before me, the feathers of the throat appear somewhat dull and worn, later in the season the color would no doubt be brighter.

I have named this fine species in compliment to Mrs. Bryant, the widow of my friend, the late Dr. Henry Bryant, of Boston. In the Proceedings of the Boston Soc. of Nat. Hist. for 1859, Dr. Bryant gave an interesting account of *D. evelynæ*, a beautiful ally of the above species, several specimens of which he obtained at the Bahamas in that year; Mr. Gould states that these were the first procured since the discovery of the type, thirty years previously.

Oreopyra venusta.

Male. Front and entire crown of a metallic pale green when looked at from the front, on a side view bluish green; upper plumage besides, of a rather dull shining green, somewhat golden;

cating character, in fact it cannot even be termed brilliant; this last I should judge to be in color much like that of *O. hemileuca*, Salvin, which is given as amethystine or violet blue.

Mr. Salvin's *O. calolæma*, according to the description, seems in the character of its colors to approach closely to *Panterpe insignis*, Cab., in which the crown and part of the breast are blue, and the throat coruscating golden red. I strongly incline to the opinion, that *Panterpe* and *Oreopyra* are generically the same.

Oreopyra cinereicauda.

Crown of a brilliant greenish blue in all positions; upper plumage grass green with a golden tinge; upper tail coverts dull dark bronzy green; tail grayish cinereous, the two central feathers a little darker, all with blackish at their ends; quills brownish purple; chin and throat white, breast shining green, sides yellowish green, abdomen cinereous washed with dull bronzy green; under tail coverts dull bronzy green, with grayish margins; a white stripe extending back from the eye; bill black.

Length about 4¼ in.; wing 2$\frac{9}{16}$; tail 1⅛; bill broken.

Habitat.—Costa Rica. Also received from Mr. Garsia.

Remarks.—In having the throat white, this species is like *O. leucaspis*, Gould, but the crown in that is said to be grass green, which in the bird before me is of a decided shade of blue; it also differs in the white gorget not being surrounded with black, and the tail being of a clear cinereous, instead of steel black.

XLVII.—*Additional Note on the Natural History of the Scorpion.*

By the Hon. Richard Hill, of Jamaica, W. I.

(Communicated by T. Bland.)

Read 27th May, 1867.

Dr. Cargill assures me, the scorpion, on feeling itself incommoded by the presence of anything that either displeases or annoys it, stings itself to death. He has put a drop of chloroform in the glass vessel in which he inclosed the scorpion, and where it fed and thrived, reconciled to its state of captivity, and after the drop of chloroform was introduced, and the scorpion paused to ascertain the inconvenience it was suffering, it then postured itself and deliberately applying the sting to its head destroyed itself.

Scorpions are impatient of sunshine. When they are so circumstanced by exposure in a clear bottle, that they cannot place themselves in a shady place, they endeavour so to set themselves up end-ways, propping themselves up by the legs and the combed

INDEX.

[The names of new species, or concerning which new information is given, are printed in Roman letter; synonyms, and species to which only incidental reference is made, are in *Italics;* names of sub-families, families, or higher divisions, in SMALL CAPITALS.]

PAGE.

- *Acadiolite*, 190
- Acanthinula Beck, 24, 38
- Accipiter *Cooperii* Bon., 280
    - *fuscus* Gm., 280
- Achatina Californica Pf., 166
- Acteon *punctostriata* Stimpson, 152
- Actiturus *Bartramius* Wils., 294
- Actodromas *Bonapartii* Schl., 294
    - *Cooperi* Baird, 294
    - *maculata* Vieill., 294
    - *minutilla* Vieill., 294
- Adelocephala Boisd., 379
- *Adularia*, 193
- AEGERIIDÆ, 364
- Aegeria, 364
- Aegiothus *linaria* L., 288
    - *melodus* Ord., 295
    - *semipalmatus* Bon., 100, 294
    - *vociferus* L., 294
    - *Wilsonius* Ord., 294
- Aegopis Fitz, 28
- Aellopos, 203
- Aellopos *tantalus* L., 203
    - *titan* Cr., 203
- Aestrelata *meridionalis* Lawr., 298
- AETOBATINÆ Ag., 134, 135
- Aetobatis M. H., 135, 136
    - laticeps Gill, 137
    - *latirostris* A. Dum., 138
    - *narinari* 138
- Aix *sponsa* L., 297
- Agelaius *phœniceus* L., 289
- Aglæactis *æquatorialis*, 471
    - *Castelnaudi*, 471
    - *caumatomata*, 471
    - *cupreipennis*, 471
    - olivaceocauda Lawr., 470
    - *Pamela*, 471
    - *parvula*, 471
- Aglaja Alb., 40
- ALAUDIDÆ, 289
- *Albite*, 190, 191, 193
- ALCEDINIDÆ, 183, 290

PAGE.

- Alexia *myosotis* Drap., 153
- ALCIDÆ, 300
- *Allophane*, 192
- Allotropa Torr., 55
- *Aluardite*, 192
- Alypia, 364
- Amazilia Graysoni Lawr., 404
    - *cinnamomea*, 405
- Amblyopsis, 399
- Ambulyx Boisd., 203, 204, 206, 207
    - *gannascus* Stoll, 203, 204, 206, 207
    - sexoculata Grote, 204, 206
    - *strigilis* L., 203, 206, 207
- Ammalo Walk., 386, 387
    - helops, 386
    - impunctus Grote, 387
- Ammobroma Torr., 51
    - sonorae Torr., 52
- Ammodromus *caudacutus* Gm., 286
    - *maritimus* Wils., 286
- Ammonoceras Pf., 22, 35
- AMPELIDÆ, 285
- Ampelis *cedrorum* Vieill., 285
    - *garrulus* L., 285
- Amphonyx, 203, 354
    - *antaeus* Drury, 203, 254
    - *cluentius* Cr., 202, 203
    - *duponchel* Poey, 203, 354
    - *hydaspes*, 354
- Anabazenops lineatus Lawr., 127
- Anas *boschas* L., 13, 296
    - maxima Gosse, 296
    - *obscura* Gm., 297
- ANATIDÆ, 13, 295
- ANATINÆ, 13
- Anceryx Boisd., 354, 355
- Anchistoma Klein, 18
- Ancylocheilus *subarquata* Guld., 294
- Anisota, 375, 379
    - *pellucida*, 457
- Anodonta *fluviatilis* Lea, 152
- Anoma Alb., 161
- Anomia *aculeata* Gm., 152, 194

PAGE.
Anomia *ephippium* L., . . . 152, 194
Anous *stolidus* L., ... 105, 106
Anser *cærulescens* L., ... 295
    Gambelii Hartl, ... 295
    hyperboreus Pal., ... 295
Anthophyllite, . . 111, 116, 123, 191
Anthus *Ludovicianus* Gm., . . . 283
Antrostomus *vociferus* Wils., . . 290
Apatite, ... 190, 191
Aphredoderus gibbosus Le Sueur, 399
Aplome, ... 188
Aplysia *protea* Rang., ... 428
Apophyllite, ... 192
Aquila *Canadensis* L., ... 285
AQUILINÆ, ... 2
Ara *aracauga* L., ... 11
ARAINÆ, ... 11
Aramides *ruficollis* Gm., . . 178, 184
Arca *antiquata* L., ... 428
    Listeri Phil., ... 428
    noae L., ... 428
    pexata Say, ... 150, 152
    squamosa Lmk., ... 428
    transversa Say, . . . 150, 152
    umbonata Lmk., ... 428
Archibuteo *Sancti Johannis* Gm., . 280
Arctia Sch., . . ? . 367, 368, 369
    celia Saund., ... 368
    decorata Saund., ... 369
    figurata, ... 368
    mexicana G. & R., . . 367, 369
    nais, ... 369

PAGE.
Basileuterus *uropygialis* Scl., . . 179
Batissa, ... 82, 229, 419
Batissa *childrenae* Ad., ... 231
    Jayana Ad., ... 83
    Keraudrenia Ad., ... 230
    lenticularis Desh., ... 232
    ponderosa Pr., ... 231
    Primeii Mor., ... 58
    similis Pr., ... 229
    solidula Pr., ... 82
    triquetra Desh., . . 230, 231
Bernicla *brenta* Steph., ... 296
    Canadensis L., ... 296
    Hutchinsii Rich., ... 296
    nigricans Lawr., ... 296
Bipinnaria Mull, ... 240
Blende, ... 247
Bombix cunegunda, ... 368
    didyma Beauv., ... 386
    figurata " 368
BOMBYCIDAE, . . . 367, 278, 379, 380
Bombyx, . . 368, 376, 380, 381, 385
Bonasa *umbellus* L., ... 291
Botaurus *lentiginosus* Steph., . . 292
    pinnatus Licht., ... 184
Brachiolaria, 240, 241, 242, 243, 244, 245
Brachyotus *Cassinii* Brew., . . . 281
Buarremon *brunneinuchus*, . 126, 127
    flavovirens Lawr., ... 467
    Ocai Lawr., ... 126
Bubo *Virginiana* Gm., ... 281

PAGE.

- Calcar *turbinatus*, 394
- Calidris *arenaria* L., 294
- Calliomma, 203
  - *lycastus* Cr., 203
- Callionymus, 143
  - goramensis Blkr., 143
  - pauciradiatus, 144
- Calliste *Francescæ* Lafr., 175, 179
- Callosamia Pack, 378
  - *angulifera*, 378
  - *promethea*, 378
- Campylaea Beck, 19
- Campylorhynchus brevipennis Lawr., 344
- Camptolaemus *Labradorius* Gm., 297
- CAPRIMULGIDÆ, 290
- Capsa, 424
  - *coccinea* Mart., 428
- Capulus *antiquatus* L., 428
- Caracolla *eolina* Ducl. 14
- Cardinalis *Virginianus* Bon., 286
- Cardita *borealis* Con., 151, 152, 153
- Cardium *citrinum* Chem., 428
  - *medium* L., 428
  - *Mortoni* Conrad, 152, 153, 194
  - *muricatum* L., 428
  - *Petitianum* d'Orb, 428
  - *spinosum* Meusch., 428
  - *subelongatum* Sowb., 428
- Carpodacus *purpureus* Gm. 289
- Carpodectes *nitidus* Salv., 183
- Carychium *exiguum* Say, 153
- Cassiculus *microrhynchus* Scl. & Salv., 180
  - *Prevosti* Less., 180
- Cassis *flammea* L., 428
  - *madagascariensis* Lmk., 428
  - *testiculus* Lmk., 428
  - *tuberosa* L., 428
  - *ventricosa* Mart., 428
- Casta Alb., 161
- Cathartes *atratus* Bart., 2
- Cathartes *aura* L., 2, 279
- Cautethia Grote, 202, 203
  - *noctuiformis* Walk., 203
- Celeus *castaneus* Wagl. 183
  - *squamatus* Lawr., 11
- Centurus *Carolinus* L., 291
- Centurus *Pucherani* Math., 183
- Ceophyllus *monilis*, 406
- Cephonodes Hübn., 435
- CEPOLIDAE, 140
- Ceratocampa, 381
- CERATOCAMPIDAE, 375, 376, 378
- Ceratomia, 353, 361
  - *amyntor*, 361
  - quadricornis Harr., 361
  - *repentinus* Clem., 354
- Ceres Gray, 14, 17, 156

PAGE.

- Ceres *eolina* Ducl., 14, 156
  - *Salleana* Cum., 14, 156
- Cerithium *albovittatum* C. B. Ad., 394
  - *algicola* C. B. Ad., 428
  - ambiguum C. B. Ad., 394
  - *atratum* Born, 428
  - bicolor C. B. Ad., 394
  - *costata* Da C., 394, 428
  - *eburneum* Brug., 428
  - *Emersonii* C. B. Ad., 394
  - *ferrugineum* Say, 395, 428
  - *fusiforme* C. B. Ad., 394
  - *gemmulosum* C. B. Ad., 394
  - *Greenii* Adams, 152
  - *iota* C. B. Ad., 394
  - Lafondii Mich., 394
  - *litteratum* Brug., 428
  - *megasoma* C. B. Ad., 395
  - *minimum* Gmel., 395, 428
  - *muscarum* Say, 428
  - *nigrescens* Mke., 395, 429
  - *nigrocinctum* Adams, 152
  - *Petitii* Kien, 394
  - *punctatum* L., 394
  - rugulosum C. B. Ad., 395
  - *Sayi* Menke, 152
  - *septemstriatum* Say., 395, 429
  - *servile* C. B. Ad., 394
  - *terebellum* C. B. Ad., 429
  - variabile C. B. Ad., 394, 429
  - *versicolor* C. B. Ad., 429
  - vicinum C. B. Ad., 395
  - *zonale* Brug., 395
- Certhia *Americana* Bon., 283
- CERTHIADÆ, 283
- Certhiola *luteola* Licht., 174
- Ceryle *alcyon* L., 290
  - *inda* L., 183
- *Chabasite*, 190
- *Chalybite*, 189
- Chama *ferruginea* Rv., 429
  - *florida* Lmk., 429
  - *macrophylla* Chem., 429
  - *sarda* Rv., 429
- CHAENOPSIDAE, 141
- Chaenopsis Poey, 141
  - ocellatus Poey, 143, 300
- Chaetura *pelasgia* L., 291
- Chamæpelia *rufipennis* Bon., 178
- CHARADRIIDÆ, 294
- Charadrius *Virginicus* Borck., 96, 98, 294
- Charidea Dalm., 365
  - bivulnera, 365, 366
  - *fastuosa* Mén., 366
  - *fulgens*, 366
  - *fulgida*, 366
  - *jucunda*, 366
  - *micans*, 366

PAGE.
Charidea *splendida*, ... 366
Chaulelasmus *streperus*? L., . . . 297
Chemnitzia *bisuturalis* Stimp., . . 152
    exilis C. B. Ad., ... 395
    flavocincta C. B. Ad., . . 395
    interrupta Stimp., . . 150, 152
    laevis C. B. Ad., ... 395
    multicostata C. B. Ad., . . 395
    obeliscus C. B. Ad., . . . 395
    puncta C. B. Ad., ... 395
    seminuda Stimp., ... 152
    substriata C. B. Ad., . . . 395
    subulata C. B. Ad., ... 395
    trifida Stimp., ... 152
Chimotrema Raf., ... 37
Chiromachæris *Candei* Parzud, . . 183
Chiton *piceus* Gml., ... 429
Chlorite 190, 193
Chloroclysta, ... 460
Chlorophanes *spiza* L., ... 174
Choerocampa Dup., . . 203, 356, 358
    anubus, ... 358
    ceratomioides G. & R., . . , 358
    gundlachii H-S., ... 203
    irrorata Grote, ... 203
    laevis G. & R., ... 356
    nechus Cr., ... 203, 358
    nitidula, ... 358
    porcus Hübn., ... 203, 358
    robinsonii Grote, ... 203
    tersa Linn., ... 203
    versuta Clem., ... 358
CHOERROCAMPINI, ... 356

PAGE.
Coccygus *erythrophthalmus* Wils., . 291
Carneipes Julieni Lawr., . . . 41, 98
COCHLIDIAE, ... 372
Cochlodesma Leanum Couth., . . . 152
Coereba *carneipes* Scl., ... 174
CŒREBIDÆ, ... 174, 179
Colaptes *auratus* L., ... 291
Collyrio *borealis* Bon., ... 285
Coloradia Blake, ... 377
    pandora, ... 377
Columbella *avara* Say, ... 152, 194
    Broderipii Sowb., ... 397
    catenata Sowb., . . . 395, 429
    costulata C. B. Ad., ... 395
    dormitor Sowb., ... 395
    lactea Sowb., ... 429
    lunata Sowb., ... 150, 152
    mercatoria L., ... 429
    nitida Lmk., ... 429
    obesa C. B. Ad., ... 395
    ocellata Gml., ... 429
    ovulata Lmk., ... 429
    purpurascens C. B. Ad., . . 395
    subcostata C. B. Ad., . . . 395
COLUMBIDÆ, ... 11, 179, 291
COLYMBIDÆ, ... 300
Colymbus *arcticus* L., ... 300
    septentrionalis L., ... 300
    torquatus Brunn., ... 300
Contopus *borealis* Sw., ... 290
    lugubris Lawr., ... 134
    Richardsoni, ... 134
    virens L., ... 290

PAGE.
Corbicula *Australis*, ... 80
Bengalensis Desh., ... 220
Bengalica Desh., . . 220, 221
Blandiana Pr., ... 71
brunnea Pr., ... 66, 67
Chemnitziana Pr., . . 60, 78
colonialis Pr., ... 416
consanguinea Pr., ... 417
cor, . . 63, 64, 65, 71, 77, 217
crassula Mouss., . . . 216, 217
Crosseana Pr., . . 72, 74
Cumingii Desh., 73, 217, 218, 219
cuneiformis, ... 421
densata Con., ... 421
difficilis Pr., . 62, 63, 64, 65, 71
ducalis Pr., ... 225
erosa Pr., ... 213, 214
Forbesii Desh., ... 421
fluminea, ... 59, 60, 61
gracilis Pr., ... 73, 226
grandis Desh., . . . 226, 228
inaequilateralis Pr., . 80, 81
insularis Pr., ... 414
Japonica Pr., . . . 68, 69
Kirkii Pr., ... 66, 67
Lamarckiana Pr., ... 69
Largillierti Desh., 78, 79, 80,
223, 420, 421, 422
Larnaudieri Pr., ... 415
Leana, Pr., ... 68
leviuscula Pr., . . 64, 65, 71
Linneana Pr., ... 70
lutea Mor., ... 61, 62
Lydigiana Pr., . 214, 215, 216
Malaccana Desh., . . 65, 71
Malaccensis Desh., ... 65
Manillensis, ... 72, 74
mediocris Pr., . . . 414, 415
minor Pr., ... 80
Moreletiana Pr., ... 416
Mülleriana Pr., . . 58, 59, 60
notata Pr., . . 217, 218, 219
obsoleta, ... 420, 421
occidens Benson, 219, 220, 415
parvula Pr., ... 76
pexata Pr., ... 57
Pfeifferiana Pr., ... 417
Pisidiiformis Pr., . . 214, 215
Primeana Morch, . . 226, 228
Primeana, Mor., . . 58, 68
prolongata Pr., ... 70
pulchella, ... 221
purpurea Pr., . . . 77, 217
pusilla, ... 225
Quilonensis Benson, . 76, 224
radiata, ... 67, 75, 225
rhomboidea Pr., ... 66
Sayana Pr., . . . 70, 71, 72
similis Desh.,] . . . 226, 228

PAGE.
Corbicula solidula Pr., ... 81
squalida Desh., . . . 217, 218
Stimpsoniana Pr., ... 222
striatella Desh., 72, 74, 222, 417
subradiata Pr., . . . 75, 76
sulcatina Desh., . . 79, 80, 223
triangularis Desh., . . 215, 216
trigona Desh., . . . 82, 221
tumida Desh., 76, 219, 220, 416
venustula Pr., ... 73
violacea Pr., ... 74, 77
vulgaris Pr., ... 223
Woodiana Desh., 226, 227,
228, 229
CORBICULADÆ, . . . 57, 213, 414, 418
Corbula *contracta* Say, ... 151
CORVIDAE, ... 289
Corvus *carnivorus* Bart., ... 289
Americanus Aud., ... 289
ossifragus Wils., ... 289
COTINGIDÆ, ... 9, 182
Coturniculus *Henslowi* Aud., . . 287
manimbe, ... 475
mexicanus Lawr., ... 474
passerinus Wils., ... 287
peruanus, ... 475
Cotyle *flavigastra* Lawr., ... 3
riparia L., ... 285
uropygialis Lawr., . . . 3
CRACIDÆ, ... 12
CRACINÆ, ... 12
Crax *globicera* L., ... 12
Crepidula *convexa* Say., ... 152
fornicata Lam., 150, 152, 194
unguiformis Lam., 150, 152, 194
Cribrella, ...
Crotophaga *sulcirostris* Sw., . . 11
CROTOPHAGINÆ, ... 11
Crucibulum *auriculatum* Chem., . 429
Ctenodiscus, ... 245
CUCULIDÆ, ... 11, 41, 177, 291
Cumingia *tellinoides* Con., . 151, 152
Cupidonia *cupido* L., ... 291
Cyanocitla *cristata* L., ... 289
Cyanospiza *ciris* L., ... 176
cyanea L., ... 179, 286
Cygnus *Americanus* Sharpl., . . 295
Cylindrella, ... 160, 161, 162
Chemnitzeana Fer., . . . 161
clara Pf., ... 160
decollata Nyst., ... 161
Cumingiana Pf., ... 161
elegans Pf., ... 161
elongata Chem., ... 161
Goldfussi Mke., ... 160
Greyana C. B. Ad., . . . 161
pilocerei Pf., ... 161
porrecta Gould, ... 161
scaeva Gund., ... 161

PAGE.
Cylindrella *subula* Fer., ... 161
turris Pf., ... 160
Cyphorinus cantans Lawr., . . . 5
cantans Gm., ... 5
Lawrencii Scl., ... 5
Cypræa *exanthema* L., ... 429
nivea Gray, ... 429
pediculus L., ... 429
rotunda Kien., ... 429
spurca L., ... 429
succincta L., ... 429
suffusa Gray, ... 429
CYPSELIDÆ, ... 291
Cyrena, 83, 232, 235, 236, 417, 419, 420, 425
Africana Krauss, . . 224, 225
Agrensis Kurr, ... 75
Bengalica Lam., ... 88
Bernardiiana Pr., 83, 84, 85, 86
Ceylonica Lam., ... 85
Chilina Pr., ... 418
Cochinensis Hanley, . . . 236
compressa Desh., ... 62
Corbiculæformis Pr., . . . 236
Cyprinæformis Pr., . 88, 89
Cyprinoides Quoy, . . . 90
exquisita Pr., ... 417
fotris Pr., ... 419, 420
fluminea Mouss., ... 225
Gauritziana Krauss., . . . 224
germana Pr., ... 417
Largillierti Phil., . . 78, 79
laevis Pr., ... 233, 234

PAGE.
Dafila *acuta* L., ... 13, 297
Daphnella lymnæiformis Kien, . . 429
Daremma Walk., ... 354
Deilephila, ... 203
calverleyi Grote, ... 203
lineata Fabr., ... 203
Demiegretta *Ludoviciana* Wils., . 292
DENDROCOLAPTIÆ, . . . 4, 127, 180
Dendrocolaptes *Sancti-thomæ* Lafr., 180
DENDROCOLAPTINÆ, ... 4
Dendrocygna *autumnalis* L., . . 13
Dendrœca *coronata* L., ... 6
Dendroica *æstiva* Gm., . 174, 179, 284
Blackburniæ Gm., ... 284
Canadensis L., ... 284
castanea Wils., ... 284
coronata L., ... 284
discolor Vieill., ... 284
maculosa Gm., ... 284
palmarum Gm., ... 284
Pennsylvanica L., ... 284
pinus Wils., ... 284
striata Forster, ... 284
tigrina Gm., ... 284
virens Gm., ... 284
Dendrornis *eburneirostris*, . . 481, 482
guttatus Lawr., ... 4
mentalis Baird, ... 481
nana Lawr., ... 4
pardalotus Vieill., . . . 4, 180
Dentalium, ... 429
Deweylite, ... 249
Diaphora Alb., ... 161

PAGE.
Dirphia, 378
tarquinius, 378
Discus Fitz, 20
Dolichonyx *orizivorus* L., 98, 289
Dolium *galea* L., 429
pennatum Mart., 429
Dolomite, 124
DONACIDAE, 425
Doricha bryantæ Lawr., 483, 484
elizæ, 483
enicura, 484
evelynæ, 483, 484
Drepanodes Guen., 451
aquosus G. & R., 453
puber G. & R., 451
varus G. & R., 452, 454
Dryocampa, 375, 379, 381
DRYOCAMPINI, 378, 379
Dysithamnus rufiventris Lawr., 131
semicinereus, 131
striaticeps Lawr., 130

Eacles, 378, 379, 380, 381, 386
imperialis Hübn., 380, 381, 386
magnifica Walk., 381
Echinaster, 245
Ecpantheria, 368, 369, 371, 372
leucarctioides G. & R., 369, 371, 372
scribonia, 368
Ectopistes *migratorius* L., 291
Eremophila *cornuta* Wils., 289
ELAINEINÆ, 8
Elainea Chiriquensis Lawr., 176
Frantzii Lawr., 172
semiflava Lawr, 177, 182
subpagana Scl., 173, 176, 177
Ellopia Treits., 455
bibularia G. & R., 455, 457
endropiaria G. & R., 457
flagitiaria Guen., 456
fiscellaria Guen., 456, 458
pellucidaria G. & R., 456
Emarginula *octoradiata* Gml., 429
Embernagra *striaticeps* Lafr., 180
Empidias *fuscus* Bon., 290
Empidonax *acadicus* Gm., 290
flavescens Lawr., 133
flaviventris Baird, 8, 290
minimus Baird, 290, 402
pectoralis Lawr., 402
Traillii Aud., 8, 290
Endropia Guen., 444, 458
amoenaria Guen., 447
aniliaria H—S., 446
arefactaria G. & R., 414, 446
astylusaria Walk., 446
textrinaria G. & R., 449
vinosaria G. & R., 448, 449

PAGE.
Endropia vinulentaria G. & R., 446, 449
Ennomos Treits., 443
angularia, 444
coloradaria G. & R., 443
tiliaria, 444
subsiquaria Hüb., 288
Enyo, 196, 197, 203
camertus Cr., 196, 197, 203
danum, 197, 203
gorgon Cr., 197
lugubris L., 196, 197, 203
Epidote, 189
Erato *cypraeoides* C. B. Ad., 395
Erennetes *pusillus* L., 100, 294
Erinnyis Hübn., 196, 200, 354
alope Drury, 196, 203
caicus Cr., 196, 203
cinerosa Gr., 201, 202
congratulans Gundl., 200, 203
ello L., 196, 203
guttularis Walk., 196, 203
melancholica Gr., 196, 201
merianae Gr., 196, 202
obscura Fabr., 202
oenotrus Cr., 196, 201, 203
pallida Gr., 203
Poeyi Gund., 200
rimosa Gr., 196, 201, 203
scyron, 196
stheno, 202
Erismatura *rubida* Wils., 298
ERYCINIDÆ, 351
Erynnis Schk., 354
Euchromia, 376
Euchronia Pack., 376
Eudryas, 364
Eugonia, 443
Eulampis *chlorolæmus* Gould, 98
Eulima arcuata C. B. Ad., 395
incerta Orb., 39
Euparypha Hartm., 40
Eupherusa cupreiceps Lawr., 348
eximia, 134, 135, 349
niveicauda Lawr., 134
Euphonia crassirostris Scl., 174, 175
hirundinacea Bon., 174, 175
purpurea Lawr., 466
violacea, 175, 467
Eupithecia Curtis, 459
anguilineata G. & R., 459
geminata, 459
Eupseudosoma Grote, 371
Eupyrrhoglossum, 203
sagra Poey, 203
Euscirrhopterus Grote, 372
Euspiza *Americana* Gm., 180, 286
Eustroma, 462

FALCONIDÆ, 2, 178, 184, 279

PAGE.
Falco *anatum* Bon., ... 279
Fasciolaria *Tulipa* Lmk., ... 429
Feldspar, ... 109, 186, 187, 191
Fissurella *barbadensis* Gml., . . . 429
    cancellata Sowb., ... 429
    gemmulata Rv., ... 429
    graeca L., ... 429
    pustula L., ... 429
Florida *cœrulea* L., ... 292
FORMICARIDÆ, . . . 6, 130, 180, 401
FORMICARIINÆ, ... 6
FORMICIVORINÆ, ... 6
Formicivora *melæna* Sol., ... 6
    schisticolor Lawr., . . . 172
    virgata Lawr., ... 6
Franklinite, ... 248
FRINGILLIDÆ, . . . 10, 176, 179, 286
Fruticicola Held, . . . 19, 25, 38
Fulica *Americana* Gm., . . 100, 295
Fuligula *viola*, ... 296
Fulix *affinis* Forster, ... 296
    collaris Don., ... 297
    marila L., ... 297
Fusus *decemcostatus* Say, . . 150, 151
    muricoides C. B. Ad., . . . 396
    nitens C. B. Ad., ... 396

Galatea, ... 422, 424, 425
Galatea *radiata*, ... 422
Galeoscoptes *Carolinensis* L., . . 282
Gallinago *Wilsonii* Temm., . . . 293
Gallinula *galeata* Licht., . . 184, 295

PAGE.
Grallaricula *ferrugineipectus* Scl., . 347
Granite. 112, 115
Grapta Kirby, ... 432, 433
    C-argenteum Kirby, . . . 433
    faunus Edwds., . . . 432, 433
    gracilis G. & R., . . 432, 433
Greenockite, ... 250
Guiraca *cœrulea* L., ... 286

Hadrostomus albiventris Lawr., . 475
    affinis, ... 475
HAEMATAPODIDÆ, ... 295
Haematopus *palliatus* Temm., . . 295
Haemorrhagia G. & R., ... 435
    buffaloensis G. & R., 435, 437, 439
    floridensis G. & R., . 435, 439
    fuscicaudis (Boisd.), . 435, 441
    gracilis G. & R., 435, 437, 439
    thysbe G. & R., 435, 438, 439, 441
Haliaetus *leucocephalus* L., . . . 280
Haliplana *discolor* Coues, . . 104, 105
    fuliginosa Gm., . 104, 105, 184
    payana Lath., ... 104
Harelda *glacialis* L., ... 297
Harporhynchus *rufus* L., ... 282
Hazis Boisd., ... 377
Hedymeles *Ludovicianus* L., . . . 286
HELICACEA, ... 23
HELICEA, ... 22
Helicella Lam., ... 20

PAGE.
Helix *aspersa* Müll., ... 34
asteriscus Morse, . 32, 163, 164
Audouini Orb., ... 40
auriculata Say, 18, 23, 24,
30, 33
auriformis Bland, ... 32
avara Say, . . . 18, 24, 33
Ayersiana Newc., ... 40
barbigera Redf., . . 24, 29, 33
Baskervillei Pf., ... 40
Berlanderiana Moric., 19, 34
bicostata Pf., ... 23
Boothiana Pf., ... 23
Bridgesii Newc., ... 40
bucculenta Gould, . . 24, 34
bulbina Desh., ... 34
caduca Pf., . 20, 22, 25, 27, 31
Californiensis Lea, . . . 40
capsella Gould, . . 20, 22, 31
Carpenteri Newc., ... 40
Carpenteriana Bland. 24, 32
cellaria Müll, . . 20, 22, 31
cereolus Muhlf., . 18, 21, 23, 32
chersina Say, . 20, 22, 31,
153, 154
Christyii Bland, ... 34
Clarkii Lea, ... 34
clausa Raf., ... 18
clausa Say, . . 24, 25, 26, 34
Columbiana Lea. . . 26, 40
concava Say, 19, 20, 23, 32, 165
conspecta Bland, . . 163, 164
convexa Raf., ... 18
Cooperi W. G. Binn., . . . 32
costata Müll, ... 18, 34
cultellata Thoms., ... 39
Cumberlandiana Lea, 20, 23, 32
delitescens Shuttl., . 23, 24
demissa Binn., . . 20, 22, 31
dentifera Binn., 18, 24, 25, 34
devia Gould, ... 40
divesta Gould, . . 24, 25, 34
Dorfeuilliana Lea, 18, 29, 33
Downieana Bland, ... 34
Dupetithouarsi Desh., . . 40
Edgariana Lea, 18, 24, 29, 33
Edvardsi Bland, . . . 29, 33
egena Say, . . . 20, 31, 34
electrina Gould, 19, 21, 22,
31, 153
elevata Say, . . . 19, 24, 33
Elliotti Redf., ... 31
espiloca Rav., ... 33
euryomphalus Pf., . . 27, 28
euspira Pf., ... 22
exarata Pf., ... 40
exigua Stimp., . . 18, 23, 32
exoleta Binn., . 19, 24, 25, 34
Fabricii Beck, . . . 22, 31

PAGE.
Helix *fallax* Say, . . . 18, 24, 33
fastigans S. W. Say, 19, 23, 33
fatigiata Say, . . 19, 21, 23
fidelis Gray, ... 40
fraterna Say, ... 18
friabilis W. G. Binn., . . 31
fuliginosa Griff., 20, 21, 22,
26, 27, 28, 31
fulva Drap., . . 20, 22, 31, 39
germana Gould, 18, 24, 30, 39
glaphyra Say, ... 34
griseola Pf., ... 19, 34
gularis Say, . . 20, 23, 28, 31
Gundlachi Pf., . . 20, 22, 31
harpa Say, ... 24, 34
Hazardi Bland, . . 29, 30, 33
Hindsi Pf., . . . 18, 24, 32
hippocrepis Pf., 18, 24, 29,
30, 33
hirsuta Say, 18, 24, 29, 33,
153. 154
hispida L., . . . 19, 25, 34
Hopetonensis Shuttl., 19, 24, 33
hortensis Müll., ... 34
Hubbardi Brown, ... 32
hydrophila Ing., . . 20, 31
incrustata Poey, . . 24, 32
indentata Say, . 21, 22, 31, 153
inflecta Say, . . . 18, 24, 33
infumata Gould, ... 40
Ingallsiana Shuttl., 24, 25, 34
inornata Binn., ... 31
inornata Say, . . 20, 22, 26
intercisa W. G. Binn., . . 40
interna Say, . . . 20, 23, 31
intertexta Binn., . 20, 22, 31
introferens Bland, . 29, 30, 33
jejuna Say, ... 34
Kelletti Forbes, ... 40
kopnodes W. G. Binn., 27, 31
labiosa Gould, ... 40
labrosa Bland, . . . 29, 33
labyrinthica Say, 19, 23, 25,
32, 153, 154
lævigata Raf., 20, 22, 26,
27, 31
lasmodon Phill., . . 20, 28, 32
laxata Fer., ... 23
Lecontii Lea, . . 19, 24, 29
leporina Gould, 24, 29, 30, 33
levis Pf., ... 40
ligera Say, . . . 20, 22, 31
limatula Ward, . . 22, 31
lineata Say, . . 20, 23, 32, 153
loricata Gould, 19, 24, 29, 39
lucubrata Binn., ... 26
lucubrata Say, ... 22
macilenta Shuttl., . . 20, 23
major Binn., . 19, 21, 24, 34

PAGE.
Helix *maxillata* Gould, . 24, 29, 33
Mazatlanica Pf., ... 164
microdonta Desh., ... 24
milium Morse, ... 32
minuscula Binn., 20, 23, 32, 153
minutissima Lea, ... 32
Mitchelliana Lea, 19, 24, 26, 34
monodon Rack., 18, 19, 24, 29, 33
Mooreana W. G. Binn., 29, 33
mordax Shuttl., . . 20, 23, 32
Mormonum Pf., ... 40
Mullani Bld. & Coop., . . 33
multidentata Binn., 20, 23, 32
multilineata Say, . 19, 24, 34
muscarum Lea, ...
Newberryana W. G. Binn., . 39
Nickliniana Lea, ... 40
nitida Müll., ... 20, 31
obstricta Say, . 19, 24, 25, 33
oppilata Mor., . . 19, 24, 32
Ottonis Pf., ... 22
palliata Say, 19, 21, 24, 25, 33
Pandorae Forbes, ... 40
Pennsylvanica Green, 19, 24, 26, 34
perspectiva Say, . 20, 23, 32
pisana Müll., ... 40
placentula Shuttl., . . 20, 22
planorboides Raf., 19, 20, 21, 23
polygyrella Bld. & Coop., . 32
porcina Say, ... 34
Postelliana Bland, ... 33

PAGE.
Helix *submeris* Migh., ... 25
subplana Binn., . . . 22, 32
suppressa Say, 23, 28, 31, 153, 154
tenuistriata Binn., ... 34
Texasiana Moric., . 19, 24, 32
tholus W. G. Binn., . 29, 33
thyroides Say, . 19, 24, 34, 153
Townsendiana Lea, 19, 25, 34
Traskii Newc., ... 40
tridentata Say, . 19, 24, 33, 153
triodontoides Bland., . . . 32
Troostiana Lea, 19, 21, 23, 24, 33
tudiculata Binn., ...
uvulifera Shuttl., . 19, 24, 33
Vancouverensis Lea, 19, 20, 21, 23, 25. 32, 165
varians Mke., . . 18, 25, 34
vellicata Forbes, ... 23
ventrosula Pf., . . . 24, 32
vincta Val., ... 40
viridula Mke., . . 19, 22, 31
volvoxis Parr., . 19, 21, 23, 32
vortex Pfr., . . . 21, 23, 32
Voyana Newc., ... 165
vultuosa Gould, 19, 24, 29, 30, 33, 39
Wheatleyi Bland, ... 34
zaleta Say, ... 19
Helminthophaga *celata* Say, . . . 284
chrysoptera L., ... 284
peregrina Wils., . . . 174, 284
pinus L., ... 284

PAGE.
Histrionicus *torquatus* L., 297
Holorhinus, 135
  vespertilio Gill, 137
Holospira Alb., 161
Hornblende, 116, 188
Hornblende Slate, 113
Hyalina Fer., 20
  Gray, 22, 35
  Schum., 20
Hyalite, 192
Hydrochelidon *fissipes* L., 299
HYDROPSYCHIDAE, 145
Hygromia Risso, 19
Hylophilus *pusillus* Lawr., 179
Hylotomus *pileatus* L., 291
Hyloicus Hübn., 200, 203
  plebeia Fab., 200
  poeyi, 200, 203
Hyperchiria, 378
  varia, 378
Hyperitis *amicaria* Guen., 447
Hypopithys, 55
Hypotriorchis *columbarius* L., 279

Ianthina *planispira* Rv., 429
Iberus Mont., 19
Ibis *alba* L., 292
  Ordii Bon., 292
Icteria *viridis* Gm., 285
ICTERIDÆ, 176, 180, 289
Icterus *Baltimore* L., 176, 289
  mesomelas Wagl., 180
  spurius L., 176, 289
Indium, 247, 249
Iridina, 426
Iron *magnetic*, 191
  spathic, 189
  specular, 191, 193
Isogonostoma Fitz., 18
Isthmia Bollesiana Morse, 209
  corpulenta Morse, 210
  decora, 211
  Gouldii, 210
  milium, 210
  ovata, 208
  ventricosa Morse, 207

Junco *hyemalis* L., 286

Kaolin, 187
Kellia *planulata* Stimp., 152, 194
Kyanite, 187, 188

Laconia, 27
Lacosoma Grote, 375
Lacuna *vincta* Turt., 152
Lampornis *Veraguensis* Gould, 177
LANIIDÆ, 285
Larentia, 459, 462, 463

PAGE.
LARIDÆ, 184, 298
Larus *argentatus*, 299
  Delawarensis Ord., 299
  glaucus Brunn., 219
  Hutchinsii Rich., 299
  marinus L., 299
  Smithsonianus Coues, 299
Laumontite, 192
Leda *limatula* Stimp., 152
Legatus *albicollis* Vieill., 177
Lennoa Llave, 54, 56
LENNOEAE, 56
Lethia, 353
  chersis, 353
Leucaretia Pack., 371, 372
  acraea Pack., 371, 372
Leucodora Johnst., 323
  ciliata, 324
Lia Alb., 161
Lima *scabra* Born., 429
Limacodes Latr., 372
  inornata G. & R., 372
  scapha Harris, 373
Limax *agrestis* L., 153
  campestris Binn., 153
Limestone, 256
  Bulla, 257, 259, 263
  Lagoon, 257, 267
  Madrepore, 256, 259, 268
  Porites, 256
Limnæa *columella* Say, 152
  desidiosa Say, 152
  humilis Say, 152
Limosa *fedoa* L., 294
  Hudsonica Lath., 294
Limulodes Matth., 409
  paradoxus Matth., 412
Limulus *Polyphemus*, 407
Liotia cruentata Mühlf., 429
LIPAUGINÆ, 9
Lipaugus albogriseus Lawr., 9
LITHOPHAGI, 425
Litiopa, 429
Littorina *Antonii* Phil., 429
  lineata d'Orb., 429
  littoralis F. & H., 152, 194, 195
  muricata L., 429
  mespilum Mühlf, 429
  rudis Gould, 152, 194
  ziczac Chem., 429
Lophodonta Pack., 373, 374
  angulosa Pack., 373, 374
  georgica, 373, 374
Lophodytes *cucullatus* L., 298
Lophophanes *bicolor* L., 283
LOPHOTIDAE, 140
Loxia *Americana* Wils., 288
  leucoptera Gm., 288
Lucina *aurantia* Desh., 429

PAGE.
Lucina *jamaicensis* Spl., ... 429
obliqua Rv., ... 429
pecten Link., ... 429
quadrisulcata d'Orb., ... 429
pennsylvanica L., ... 429
radula Gould, ... 151
tigerina L., ... 429
Luidia, ... 245
Lygris, ... 462, 464
Lyonsia *hyalina* Conrad, ... 152

Macroceramus Guild.. . 161, 162, 163
amplus Gund., ... 163
Gossei Pf., ... 163
Kieneri Pf., ... 163
Maugeri Wood, ... 161
signatus Guild., . . . 161, 162
tricolor Pf., ... 191
Macrocyclis Beck, . . . 18, 23, 36
Macroglossa Boisd., ... 435
MACROGLOSSINI, ... 435
Macroramphus *griseus* Gm., 100, 293, 295
scolopaceus Say, ... 293
Macrosila, ... 353, 354
aper, ... 354
carolina, ... 353, 354
cingulata, ... 353, 354
ochus, ... 354
5–*maculata*, ... 353, 354
rustica, ... 353, 354
Mactra *brasiliana* Link., ... 425
lateralis Say, ... 151, 152
similis Say, ... 152

PAGE.
Marginella *interrupta* Lam., ... 396
Lavalleana d'Orb., ... 430
maculosa Kien, ... 430
marginata Born, ... 396
nivea C. B. Ad., ... 396
nivea Born, ... 396
pallida L., ... 430
pellucida Pf., ... 430
Mariella, ... 27
Martesia *Smithii* Tryon, . . . 152, 154
Megarhynchus *Mexicanus* Lafr., . 182
Melampus bidentatus Say, ... 153
Melanchroia Hübn., . . 441, 422, 443
fumosa Grote, ... 443
geometroides Walk., ... 443
regnatrix G. & R., . 441, 443
Melanerpes *erythrocephalus* L., . 291
Melanetta *velvetina* Cass., ... 297
Melina *perna* L., ... 430
Melospiza *Lincolnii* Aud., ... 286
melodia Wils., ... 286
palustris Wils., ... 286
Melozone *leucotis* Cab., ... 481
Mergulus *alle* L., ... 300
Mergus *Americanus* Cass., ... 298
serrator L., ... 298
Mesodon Raf., ... 19, 24, 37
Mesomphix Raf., ... 22, 28, 35
Mesotype, ... 122
Myiarchus *Lawrencii* Giraud, . . . 182
Mica, ... 109, 186, 187
Micromesus, ... 136
Micropalama *himantopus* Bon., 100, 294
Microphysa Alb., ... 23, 36

PAGE.
Murex brevifrons Lam., ... 396
  cornu cervi Mart., ... 396
  pauperculus C. B. Ad., . . . 430
  pomiformis Mart., ... 430
  rarispina Lam., ... 397
  rufus Lmk., ... 430
  spectrum Pr., ... 396
Muscorite, ... 186
Mya *arenaria* Linn, . 151, 152, 153
Mychostoma Alb., ... 161
Myiodioctes *Canadensis* L., ... 285
  chrysocephalus Tsch., ... 470
  mitratus Gm., ... 6, 284
  pusillus Wils., ... 285
  superciliaris Lawr., ... 470
Myiodynastes *nobilis* Scl., ... 177
Myiozetetes *marginatus* Lawr., . . . 8
  Texensis Giraud, ... 182
MYLIOBATIDES, ... 135
MYLIOBATINÆ, ... 135, 136
Myliobatis, ... 135, 136, 137
  aquila, ... 136
  Californicus Gill, ... 137
  vespertilio, ...
  vultur, ... 136
Myliobatoids, ... 135
Mylorhina, ... 136
Myobius *atricaudus* Lawr., ... 8
  barbatus Lawr., ... 8
  sulphureipygius Scl., ... 8
Myozetetes *Columbianus* C. & H., . 177
Myriarchus *crinitus* L., ... 290
Myrmelastes *corvinus* Lawr., . . . 7
Myrmeciza *exsul* Scl., ... 133
  læmosticta Salv., ... 133
  stictoptera Lawr., ... 132
Myrmotherula albigula Lawr., . . . 131
Mytilus *edulis* L., ... 152
  modiolus L., ... 152, 194
  plicatulus Desh., ... 152

Nanina, ... 27
Nareda, ... 309
Nassa *ambigua* Pult., ... 430
  obsoleta Say, ... 151
  trivittata Say, 150, 151, 194, 195
  vibex Say, ... 150, 152
Natica *cancellata* Lam., ... 397
  canrena L., ... 430
  costata Mke., ... 397
  duplicata Say, ... 150, 152
  heros Say, . 150, 152, 194, 195
  nitida Don., ... 430
  proxima C. B. Ad., ... 430
  pusilla Say, ... 152
  rugosa Ch., ... 397, 430
  rugosa Gmel., ... 397
  Sagraiana d'Orb., ... 430
  sulcata Born., ... 397
Natica *triseriata* Say, . 150, 194, 195
Nauclerus *furcatus* L., ... 280
Nectris *fuliginosus* Strick., ... 298
Nemertes, ... 307, 317
NEMOPHIDAE Kaup., ... 138, 140
Nemophis Kaup., ... 138, 140
  Lessoni Kaup., ... 140
Nerine Johnst., ... 330
  coniocephala Johnst., ... 333
Nerita *peloronta* L., ... 430
  varia Meus, ... 430
  variegata Chem., ... 430
Neritina *chlorina* Link, ... 397
  Jamaicensis C. B. Ad., . . . 397
  ornata C. B. Ad., ... 397
  pupa L., ... 430
  Virginea L., ... 397, 430
  viridis L., ... 430
Nettion *Carolinensis* Gm., ... 297
  crecca L., ... 297
Newberrya Torr., ... 55
Notodonta, ... 373, 374
Nucula *proxima* Say, ... 152
Numenius *borealis* Forster, ... 294
  Hudsonicus Lath., . . . 100, 294
  longirostris Wils., ... 294
Nyctale *acadica* m., ... 281
Nyctea *nivea* Daud., ... 281
Nyctherodius *violaceus* L., . . 98, 292
Nyctiardea *Gardeni* Gm., ... 292
NYMPHALIDAE, ... 432
Nymphidia Fabr., ... 351, 353
  borealis G. & R., . . . 351, 352
  pumila B. & L., . . . 351, 352
Nymphidium, ... 352
  Jessa, ... 352

Oceanites *oceanica* Kuhl., ... 298
Odontostoma Orb., ... 15
Odostomia canaliculata C. B. Ad., . 397
  solida C. B. Ad., ... 397
Oeceticus, ... 375
Oenosanda Walk., ... 202
Oidemia *Americana* Sw., ... 297
OLEACINIDAE, ... 20
Oliva *fulgida* Rv., ... 430
  nivea Rv., ... 430
  oryza Lmk., ... 430
  parvula Mart., ... 430
  reticularis Lmk., ... 430
Oniscia *oniscus* Lmk., ... 439
Oporornis *agilis* Wils., ... 283
  formosus Wils., ... 284
Oreotrochilus *Estellæ*, ... 45
Oreopyra, ... 485
  calolæma Salv., ... 484, 485
  cinereicauda Lawr., ... 485
  hemileuca Salv., ... 485
  leucaspis Gould, ... 485

PAGE.
Oreopyra venusta Lawr., 484
OROBANCHACEAE, 55
Orthite, 191, 193
Orthorhynchus *exilis* Gm., 98
Ortyx graysoni Lawr., 476
pectoralis, 477
Virginianus L., 292
Ostrea borealis Lam., 150, 152
frons Linn., 430
Virginiana Lister, 152
Otus *Wilsonianus* Less., 281
Ovula *acicularis* Lmk., 430
gibbosa Lmk., 430

Pachylia, 203
ficus Linn., 203
inornata Clem., 203
resumens Walk., 203
Pachyrhampus *cinereiventris*, 182
cinnamomeus Lawr., 182
niger, 182
polychropterus Vieill., 182
Packardia G. & R., 373
albipunctata, 373
elegans, 373
fusca, 373
geminata, 373
ocellata, 373
Pandion *Carolinensis* Gm., 2, 280, 281
Pandora *trilineata* Say, 152, 194
Panterpe, 485
insignis Cab., 45, 46, 485
Pantographa Led., 464

PAGE
PELECANIDÆ, 13, 298
PELECANINÆ, 13
Pelecanus *fuscus* L., 13, 101, 298
erythrorhynchus Gm., 298
Pelidna *Americana* Cass, 294
Pelionetta *perspicillata* L., 297
Penelope *purpurascens* Wagl., 12
PENELOPINÆ, 12
PERDICIDÆ, 292
Pergesa, 203
thorates Hübn., 203
Perigonia Boisd., 199, 203
divisa H—S., 199, 203
lefeburii Lucas, 203
lusca Fabr., 199, 203
Perikline, 193
Perisoreus *Canadensis* L., 289
Perthite, 187
Petricola, 424
dactylus Say, 152, 194
lapicida Chem., 430
pholadiformis Lam., 152
typica Jon., 430
Petrochelidon albilinea Lawr., 2
leucoptera Lawr., 2
Meyenii Cab., 2
Phaeton *aethereus* L., 102
flavirostris Brandt., 103
Phaethornis Cassinii Lawr., 347
PHALACROCORACIDÆ, 298
Phalaena, 373, 376, 380, 384
laocoon, 380, 381, 384
phoronea, 380

The following were accidentally omitted in the Index to Vol. VIII. of the Annals. For temporary use this slip may be inserted between pages 500 *and* 501; *but any subscriber desirous of having a complete Index for binding, can, upon application to the undersigned, be furnished with a copy of pages* 501 *to the end containing the omitted references.*

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PAGE.
Pholas *truncata* Say, ... 152
Pholisma Nutt., ... 51, 54, 55
Phosphate of Lime, ... 190
Phosphorite, ... 190
Phryganea, ... 144, 147
PHRYGANIDAE, ... 146
Phyllodoce, ...
  maculata Oersted, . . 338, 336
Physa *heterostropha* Say, ... 152
Piaya *nigricrissa* Scl., ... 177
PICIDÆ, ... 11, 183, 291
PICINÆ, ... 11
Picus *borealis* Vieill., ... 291
  pubescens L., ... 291
  villosus L., ... 291
Pilidium, ... 307
Pineria, ... 163
Pinicola *Canadensis* Briss., . . . 288
Pinna *muricata* L., ... 430
  pernula Chem., ... 430
Pionius *senilis* Spix, ... 184
Pipilo *chlorura*, ... 481
  erythrophthalmus L., . . . 288
Pisania *pennata* Brown, ... 430
Pisidium, ... 91, 419
  abditum Hald., . . . 92, 152
  casertanum Bourgt, . . . 92
  Nov-Zeiandicum Pr., . 91, 92
Pithys bicolor Lawr., ... 6
  leucaspis Lawr., . . . 6, 7

PAGE.
PLAGIOTREMATINAE, ... 138
Plagiotremus Gill, ... 138
  spilistius Gill, . . . 140, 300
Planaria, ... 306
  angulata Mull., . . . 308, 340
Planaxis *nucleus* Lmk., ... 420
  lineatus Da Cost., ... 430
Planorbis *deflectus* Say, ... 152
  parvus Say, ... 152
Platanus *occidentalis*, ... 290
PLATYRHYNCHINÆ, ... 7
Platyrhynchus *cancroma* Lawr., 7, 8
  superciliaris Lawr., . . . 7
Platysamia Grote, ... 379
  californica, ... 379
  cecropia, ... 379
  columbia, ... 379
PLATYTHYRINI, ... 364
Platythyris G. & R., 361, 362, 363, 364
  fasciata G. & R., 362, 363, 364
  vitrina G. & R., 361, 363, 364
Plectrophanes *Lapponicus* L., . . 288
  nivalis L., ... 288
Pleurotoma albida C. B. Ad., . . 397
  Augustae C. B. Ad, . . . 397
  badia Pr., ... 396
  cerinum Kurtz & Stimps., . 152
  coccinata Rv., ... 397
  fucata R., ... 430
  fusiformis C. B. Ad., . . . 397

PTILODONTES, ... 373
Puffinus *Auglorum* Temm., . . . 298
  major Faber, ... 298
  obscurus Gm. 298
PULMONATA, ... 13

Regulus *calendula* L., ...
  satrapa Licht., ... 282
Rhetizite, ... 188
Rhinoptera, ... 135, 136
  adspersa M. H., ... 136

PAGE.
Pleurotoma minor C. B. Ad., 397
moniliferа C. B. Ad., 397
pygmaea C. B. Ad., 397
Plicatula *spondyloidea* Meusch., 430
Pneumodermon, 241
Podiceps *cornutus* Gm., 300
cristatus L., 300
griseigena Bodd., 300
Podilymbus *podiceps* L., 300
Poecetes *gramineus* Gm., 286
Polioptila *cœrulea* L., 282
superciliaris Lawr., 178
Polydora Bosc, 323
ciliatum Clap., 330
cornuta, 324, 330
Polygyra Say, 19, 23, 37
Polymita Beck, 18, 25, 38
Porzana *Carolina* Vieill., 295
Noveboracensis L., 295
Procellaria *leucorrhea* Vieill., 298
pelagica L., 298
PROCELLARIDÆ, 298
Progne *purpurea* L., 285
Proserpina Gray, 15, 17, 155, 156
bidentata C. B. Ad., 16, 156
depressa Orb., 16, 17, 156, 157
globulosa Orb., 16, 156
linguifera Jon., 15, 156
nitida Gray, 15, 156, 157
pisum C. B. Ad., 15, 156
pulchra, 15
Swifti Bland, 16, 155, 156
PROSERPINACEA, 13, 155, 156
PROSERPINADÆ, 14
Proserpinella Bland, 157
Berendti Bland, 157
PSAMMOBIDAE, 425
PSEUDOBRANCHIA, 13
Pseudohazis G. & R., 377
Pseudohazis eglanterina, 377
Pseudohazis hera, 377
Pseudosphinx, 203, 354
tetrio Linn., 203, 354
PSITTACIDAE, 11, 184
PSITTACINAE, 11
Psittacus *pulverulentus* Gm., 11
Psyche Helix, 146, 147, 149
Planorbis, 146, 149
PSYCHIDÆ, 374
Psychocampa G. & R., 374, 375
concolor G. & R., 375
Psychonoctua Grote, 372
Pteroglossus *erythropygius* Gould, 178
Pterospora, 55
PTILODONTES, 373
Puffinus *Anglorum* Temm., 298
major Faber, 298
obscurus Gm., 298
PULMONATA, 13
PAGE.
Pupa, 126
armifera Say, 152
badia, 212
bigranata, 212
Blandi W. G. Binn., 211
Californica Row., 166, 167
contracta Say, 152
decora Gould, 167
Rowellii Newc., 166, 167
rupicola Say, 152, 154
Pupilla Blandii Morse, 211
Purpura *floridana* Con., 430
galea Chem., 430
lapillus Lam., 150
patula Lam., 430
plicata Mart., 430
trapa Bolt., 430
PYRALIDAE, 464
Pyralolite, 192
Pyramidella *dolabrata* L., 430
Pyranga *æstiva* Gm., 175, 286
rubra L., 286
Pyrgisoma *biarcuatum*, 480, 481
Kieneri Bp., 481
Xantusii Baird, 480, 481
Pyrope, 188
Pyroxene, 109, 192
Pyrrhophœna *Riefferi* Bourc., 183
Pyrula *canaliculata* Brug., 151, 194
carica Brug., 151, 195
Pytilus humeralis Lawr., 467
poliogaster, 468
Quartz, 109, 113, 187, 189
Querquedula *discors* L., 101, 297
Quiscalus *macrourus* Lw., 180
versicolor L., 289
Rallidæ, 178, 184, 295
Rallus *crepitans* Gm., 295
elegans Aud., 295
Virginianus L., 295
RAMPHASTIDÆ, 178, 183
Ramphastos *carinatus* Lw., 183
piscivorus L., 183
Ramphocelus *dimidiatus* Lafr., 175
passerinii Bon., 175, 179
Ramphocœnus *rufiventris* Bon., 6, 182
Ramphomicron *heteropogon*, 45
olivaceus Lawr., 44
Stanleyi, 45
Ranella *caudata* Say, 151
ponderosa Rv., 430
Recurvirostra *Americana* Gm., 295
RECURVIROSTRIDAE, 295
RECURVIROSTRINAE, 12
Regulus *calendula* L., 282
satrapa Licht., 282
Rhetizite, 188
Rhinoptera, 135, 136
adspersa M. H., 136

PAGE.
Rhinoptera *Lalandii* M. H., . . . 136
vespertilio Girard, ... 137
Rhyacophilus *solitarius* Wils., . . 294
Rhynchocyclus flavo-olivaceus Lawr., ... 8
Rhynchocyclus *sulphurescens*, . . 8
cinereiceps, ... 8
Rhyncops *nigra* L., ... 299
Ricinula *ferruginosa* Rv., ... 397
nodulosa C. B. Ad., . 397, 430
rosea Rv., ... 430
turbinella Kien., ... 430
Rissa *tridactyla* L., ... 299
Rissoa *aculeus*, ... 194
Catesbya Orb.. 397
crassicosta C. B. Ad., . . . 397
melanura C. B. Ad., . . . 397
minor C. B. Ad., ... 397
minuta Stimp., ... 152
multicostata C. B. Ad., . . 397
scalarella C. B. Ad., . . . 397
scalaroides C. B. Ad., . . 397
tervaricosa C. B. Ad., . . 397
Rubelite, ... 109, 189
Rutile, ... 189, 192
Sagna Beck, ... 20
Saltator fulviventris Lawr., . . . 41
grandis, ... 477
intermedius Lawr., . . . 175
magnoides Lafr., . . 175, 179
magnus, ... 175
olivascens, ... 478
plumbiceps Baird, . . . 477
rufiventris Vig., ... 477

PAGE.
SCUTIBRANCHIATA, ... 13
Seiurus *aurocapillus* L., ... 284
Ludovicianus Vieill., . . . 284
Noveboracensis Gm., . . . 284
Semele *purpurascens* Gm. . . . 431
Serpentine, ... 112
Sesia Fabr., ... 435
ruficaudis Walk., ... 437
Setophaga *ruticilla* L., 97, 174, 285
Sialia *sialis* L., ... 282
Sigaretus *depressus* Phil., ... 431
Siphonaria *alternata* Say, . . . 431
Sipunculus *nudus*, ... 314
Sitta *Canadensis* L., ... 283
Carolinensis Gm., ... 283
SMERINTHINI, ... 354
Solarium *infundibuliformis* Chem., 431
Solecurtus *Caribæus* Conrad, . . 152
Solemya *velum* Say, ... 152
Solen *ensis* L., ... 152
Somateria *mollissima* L., ... 297
spectabilis L., ... 298
Spatula *clypeata* L., ... 297
Spermophila atriceps Baird, . . 479
aurita Lawr., ... 10
aurita Bon., ... 10
badiiventris Lawr., . . . 171
cinerea Lawr., ... 10
cinerea Lafr., ... 11
collaris Lawr., ... 176
corvina, ... 171, 179
fortipes Lawr., ... 170
Hicksii Lawr., ... 171
schistacea Lawr., ... 10

PAGE.
Sphinx *vitis* Smith, ... 193
Sphyropicus *varius* L., ... 291
Spirorbis *spirillum* Gould, . . . 318
,, Lam., . . . 318
Spizella *monticola* Gm., ... 286
• *pusilla* Wils., ... 286
socialis Wils., ... 286
Spondylus *fimbriatus* Meusch., . . 431
Squatarola *Helvetica* L., ... 295
Staurotide, ... 192
STENOPIDÆ, ... 20, 21
Stenopus Guild., ... 157, 159
cruentatus Guild., ... 159
Guildingi Bland, . . 157, 158
Stenotrema Raf., . 18, 24, 28, 29, 37
Stercorarius *Buffoni* Boie., . . . 299
parasiticus L.. 298
pomatorhinus Temm., . . . 298
Sterna *Antillarum* Less., . . 106, 299
Forsteri Nutt., ... 299
hirundo L., ... 104, 299
macrura Naum., ... 299
paradisea Brunn., ... 299
payanensis Gm., ... 104
Trudeaui Aud.. 299
Stilbite, ... 190
Strepsilas *interpres* L., . . . 100, 295
Streptopelia *risoria* L., ... 11
STRIGIDÆ, ... 281
Strix *pratincola* Bon., ... 281
Strombus *alatus* Gmel., ... 398
accipitrinus Mart., . . . 398
dubius Sowb., ... 398
gigas L., ... 431
Goliath Ch., ... 398
inermis Sowb., . . . 398, 431
pugilis L., ... 308, 431
Sturnella *magna* L., ... 289
mexicana Scl., ... 176
Succinea *aurea* Lea, . . . 153, 154
avara Say, ... 153, 169
campestris Say, ... 169
Grœnlandica Beck, . . . 169
Hawkinsi Baird, ... 168
Haydeni W. G. Binn., . . . 168
inflata Lea, ... 169
obliqua Say. 153
ovalis Gould, ... 153
Sillimani Bland, ... 167
Stretchiana Bland, . 168, 169
Verrilli Bland, ... 169
Sula *bassana* Briss., ... 298
fiber L., ... 101
SULIDÆ, ... 298
Surnia *ulula* L., ... 281
Syenite, ... 112
SYLVICOLIDÆ. 283
SYLVIIDÆ, ... 282
Symphemia *semipalmata* Gm., . . 294

PAGE.
Synallaxis nigrifumosa Lawr., . . 180
pudica, ... 180
Synchiropus, ... 143
Syntomis, ... 365
Syrnium *nebulosum* Forster, . . 281
Syzygia G. & R., ... 354
afflicta, ... 354
Tachypetes *aquilus* L., ... 102
Tachyphonus Napensis Lawr., . . 42
Surinamus, ... 42
tibialis Lawr., ... 41
Tanagra *diaconus* Less., . . 175, 179
TANAGRIDÆ, 9, 41, 126, 174, 179, 286
Tanagrinæ, ... 9
TANTALIDÆ, ... 292
Tarsodactylus, ... 301
caudatus, ... 302
expansus Hitch., ... 301
Tebennophorus *Caroliniensis* Binn. 153, 154
Tectura *testudinalis* Gray, . . . 194
Telea Hübn., ... 377, 378
polyphemus, ... 378
Tellina *bimaculata* L., ... 431
caribaea d'Orb., ... 431
carnaria L., ... 431
fausta Soldr., ... 431
fusca Phil., ... 152
interrupta Soldr., ... 431
laevis Chem., ... 431
pisiformis L., ... 431
radiata L., ... 431
tenera Say, ... 152
tenta Say, ... 152
Tellurium, ... 191
Terebella *conchilega*, . . . 320, 321
fulgida Ag., ... 320, 341
Medusa, ... 319
nebulosa, ... 320, 321
Terebra *hastata* Gml., ... 431
Teredo *dilatata* Stimpson, . . . 152
TETRAONIDÆ, ... 291
Tetraphyline, ... 192
Thalasseus *Caspius* Pallas, . . . 299
regius Gamb., . . . 103, 299
Thallium, ... 247, 249
Thamnophilus affinis Cab., . . . 182
Hollandi Lawr., ... 180
doliatus, ... 469
leucopygus Lawr., . . . 401
melanocrissus, ... 181
melanurus, ... 181
nigrescens Lawr., ... 469
tenuifasciatus Lawr., . . . 468
transandeanus, ... 181
Thaumatias *chionurus* Gould, . . 349
leucogaster, ... 404
viricaudus Lawr., ... 404

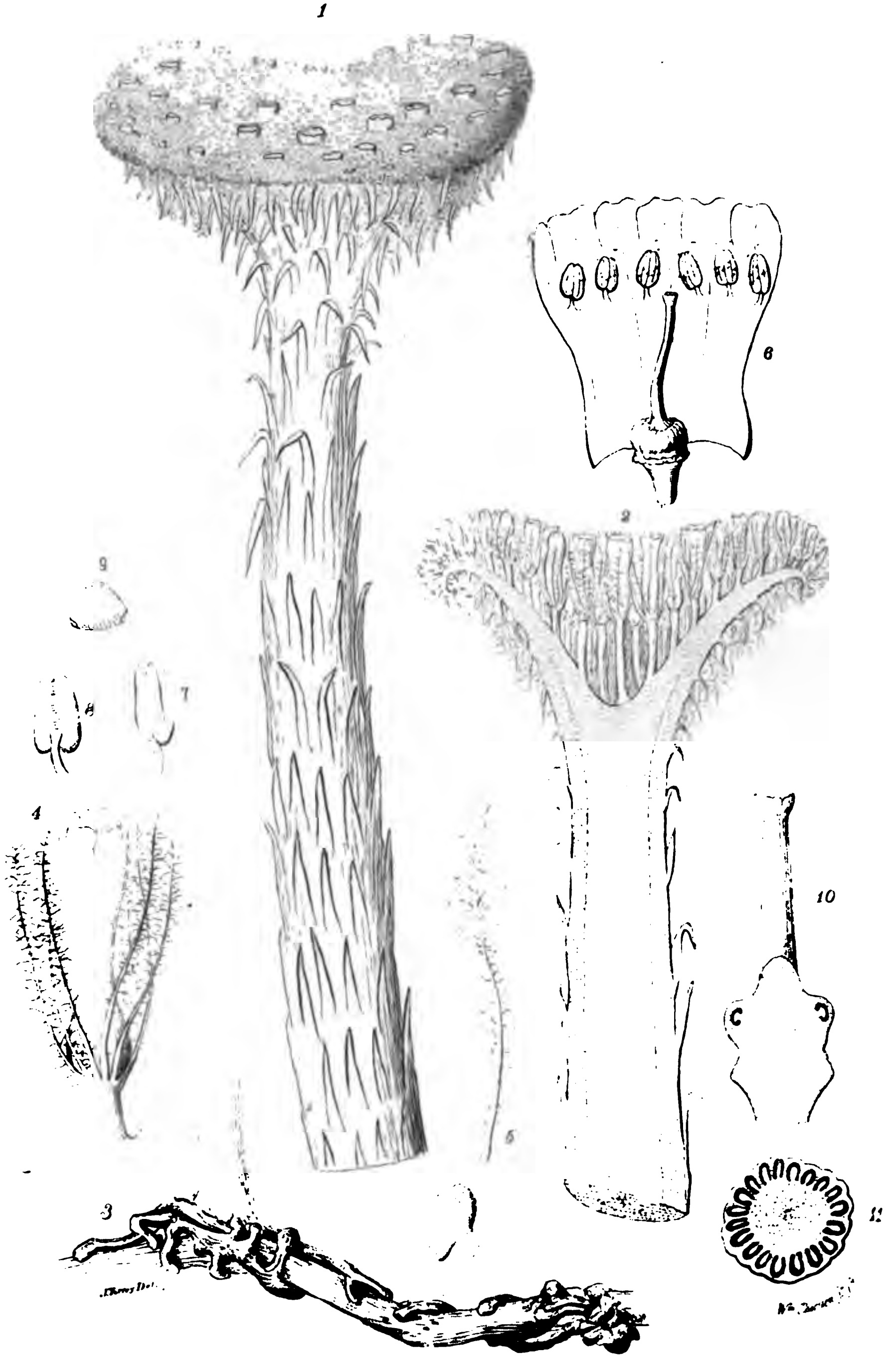
PAGE.
Thelidomus Swain, ... 144
Braziliensis Sw., ... 144
Thryothorus brunneus Lawr., . . . 178
leucotis Lawr., ...
longirostris Lawr., ... 5
Ludovicianus Gm., ... 283
modestus Cab., ... 5
rufalbus Lafr., ... 5, 174
striolatus, ... 5
Thyreus, ... 350
abbotii, ... 360
THYRIDÆ, ... 361, 364, 365
THYRINI, ... 364
Thyris Illig., . . 361, 363, 364, 365
fenestrella Scop., ... 363
lugubris Boisd., ... 365
maculata Harr., ... 363
Tigrisoma tigrina Gm., ... 12
Tinnunculus sparverius L., ... 280
sparveroides Vig., ... 97
Titanium, ... 109
Tityra *albitorques* Dubus, ... 182
Todirostrum *cinereum* L., ... 182
Tolype, ... 379
Tornaria, . 240, 241, 242, 243, 244, 5
Tornatella punctostriata Ad., . . . 150
Tourmaline, ... 188, 189
Toxopneustes, ... 245
Toxotrema Raf., ... 37
Trachelia Pfr., ... 161
Trachypteridae, ... 140
Tremolite, ... 109, 192
TRICHOPTERYGIDÆ, ... 406, 409
Tringa *canutus* L., ... 294

PAGE.
Troglodytes *Americanus* Aud., . 273
hyemalis Wils., ... 283
inquietus Baird, ... 174
TROGLODYTIDÆ, . . . 5, 174, 178, 283
TROGLODYTINÆ, ... 5
Trogon *atricollis*, ... 3, 4, 183
aurantiiventris Lawr., . . . 3
Massena Gould, ... 183
melanocephalus Gould, . . 183
tenellus Cab., ... 3, 4, 183
TROGONIDÆ, ... 3, 183
TROGONINÆ, ... 3
Tropaea Hübn., ... 378
luna, ... 368
Truncatella, ... 161
Tryngites *rufescens* Vieill., ... 294
Turbinella *brevicaudata* Rv., . . . 431
leucozonalis Lmk., ... 431
nana Rv., ... 431
scolymus, ... 431
Turbo *calcar* L., ... 398
pica L., ... 431
TURDIDÆ, ... 7, 174, 281
TURDINÆ, ... 7
Turdus *fuscescens* Steph., ... 281
Grayii Bon., ... 174
migratorius L., ... 281
minimus Lafr., ... 7
mustelinus Gm., ... 281
naevius Bon., ... 281
Pallasi Cab., ... 281
Swainsoni Cab., ... 7, 281
Turritella *bicingulata* Lam., . . . 398
exoleta L., ... 398, 431

PAGE.
Valvata agglutinans Guppy, . . . 143
arenifera Lea, . 144, 146, 147, 148, 149
depressa Pfr., ... 147
sincera Say, ... 144
unicarinata, ... 144
Velorita, . . . 285, 418, 421, 425
Cochinensis Han., 236, 287, 421
Cyprinoides Gray, . 236, 237
parvula Pr., ... 418, 421
Venus, ... 285, 424
flexuosa L., ... 431
gemma Tott., ... 152
granulata Gml., ... 431
Listeri Gray, ... 431
maculata L., ... 431
mercenaria L , ... 151, 152
notata Say, ... 152
paphia L., ... 431
pygmæa Lmk., ... 431
similis Gray, ... 226, 228
subrostrata Lmk., ... 431
ziczac L., ... 431
Vermetus, ... 431
Vertigo Gouldii Binn., ... 152
ovata Say, ... 152
Vireo *flavifrons* Vieill., ... 285
Noveboracensis Gm., ... 285
solitarius Wils., ... , 285
VIREONIDÆ, ... 6, 179, 285
PAGE.
VIREONINÆ, ... 6
Vireosylvia altiloqua Vieill., . 97, 98
atripennis Lawr., ... 97
Bogotensis Bryt., ... 6
gilva Vieill., ... 285
olivacea, ... 6, 285
Virginalis Lawr., ... 97
VITRINEA, ... 22
Vitrinella, ... 27
Vivianite, ... 192
Volatinia *jacarina* L., ... 176
Volvaria *pellucida* Schm., ... 431
VULTURIDAE, ... 2, 279
Xema *Sabinii* Sab., ... 299
Xenophora trochiformis Born., . . 431
Zenaida *amabilis* Bon., ... 98
Zenaidura *Carolinensis* L., ... 291
Zink Blende, ... 248, 249
Granulated, ... 250
Metallic, ... 250
Zonites Gray, ... 20
Mont., ... 20, 26, 27
Zonotrichia *albicollis* Gm., ... 236
leucophrys Forst., ... 286
melanotis Lawr., ... 473
Zygæna, ... 364
ZYGAENIDAE, ... 364, 365, 441
ZYGAENINAE, ... 365, 441
Zygobatis, ... 135

ERRATA.

Page 61 15th line from the bottom, for Cubicula *lutea* read Corbicula *lutea*.
75 9th " " " " Cyrene *Agrensis* read Cyrena *Agrensis*.
77 7th " " " " *Corbicula violacea* read *Corbicula purpurea*.
153 12th " " " dele both.
" 18th " " " " and Huntington.
289 17th " " " for *Cyanocitla* read *Cyanocitta*.
290 17th " " " " *Myriarchus* " *Myiarchus*.
291 10th " " " " Red-billed " Red-bellied.
354 5th " " top, " rerpentinus " repentinus.
400 6th " " bottom, " æquitorialis " æquatorialis.
428 18th " " " " Manegascariensis " Madagascariensis.
478 8th " " " " Eervantes " Cervantes.



J. Torrey Del.

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AMMOBROMA SONORÆ

III.

Plagiotremus spilistius, Gill. nat. s.

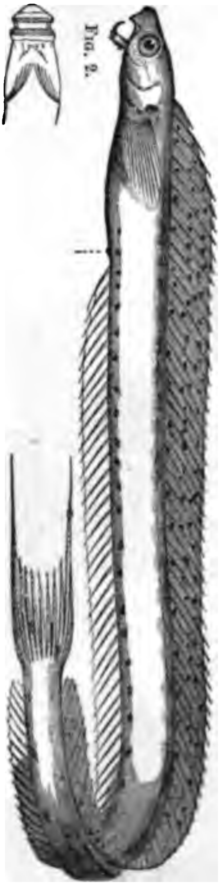
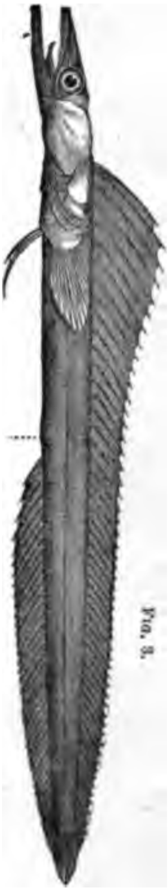


FIG. 2.

Plagiotremus spilistius, Gill. *nat. s.*
FIG. 1.



Chænopsis ocellatus, Poey.

FIG. 3.

Plate IV.

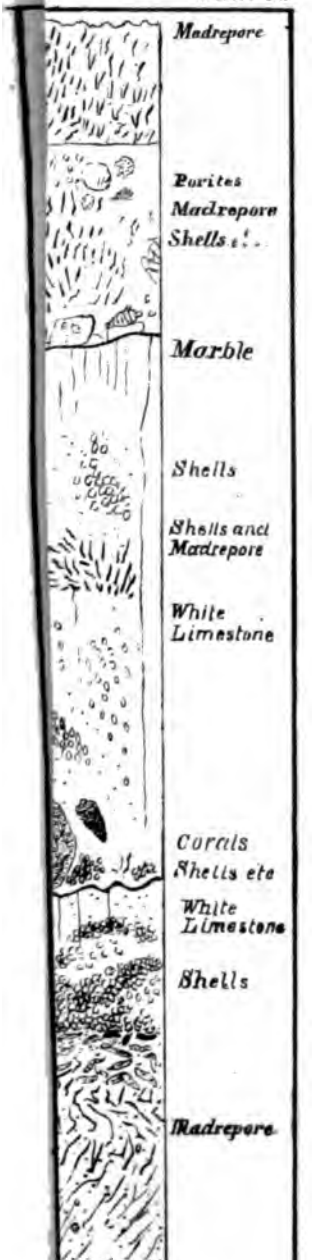
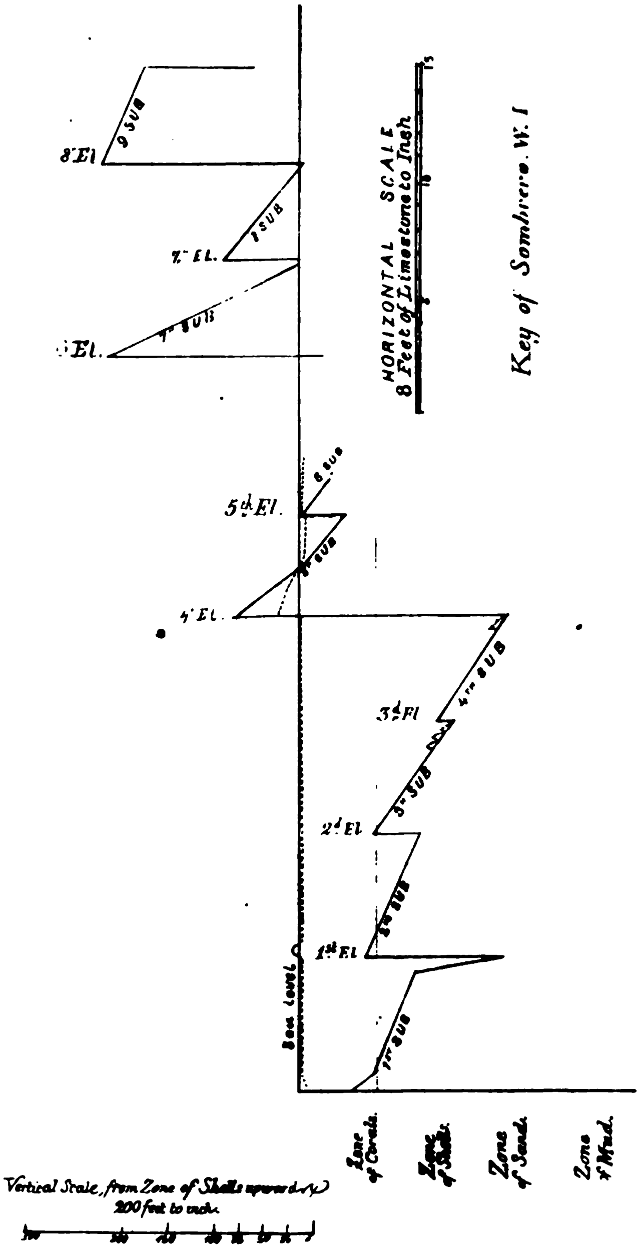

Madrepore
Porites
Madrepore
Shells &c.
Marble
Shells
Shells and Madrepore
White Limestone
Corals
Shells etc
White Limestone
Shells
Madrepore
SEA LEVEL

Fig. 3.



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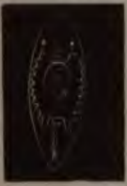

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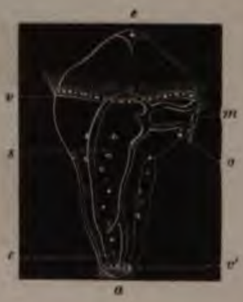

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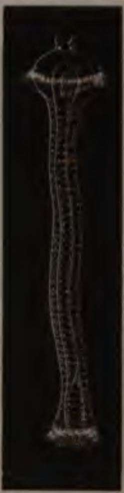

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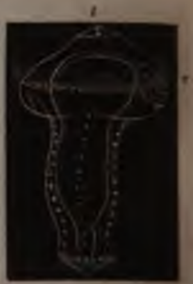

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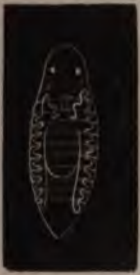

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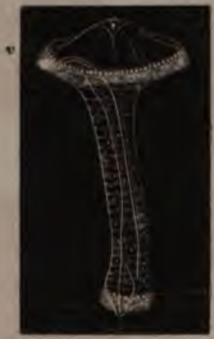

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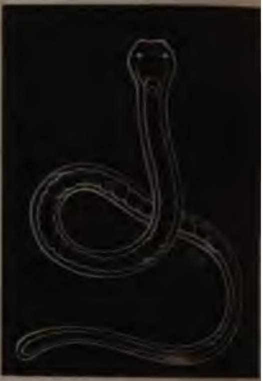

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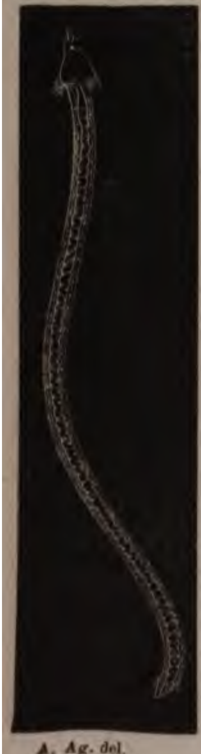

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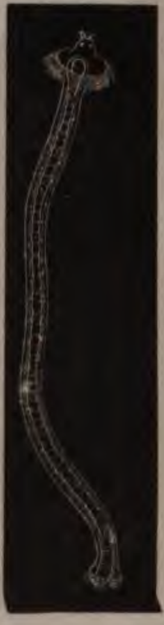

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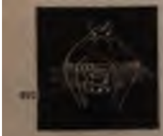

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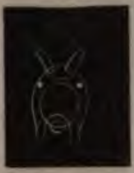

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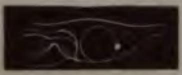

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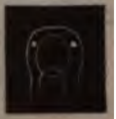

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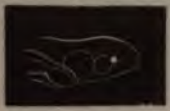

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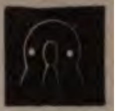

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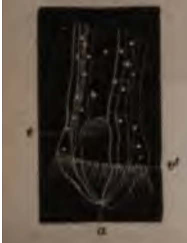

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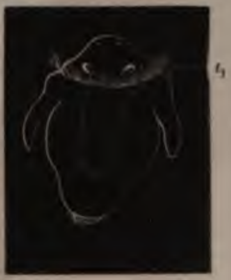

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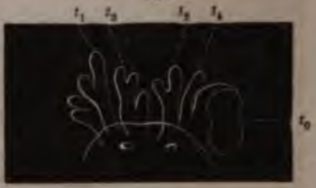

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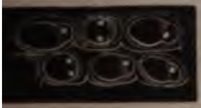

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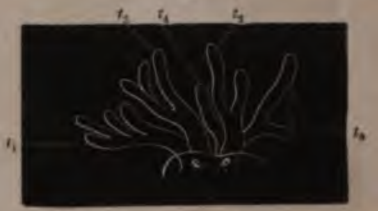

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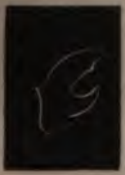

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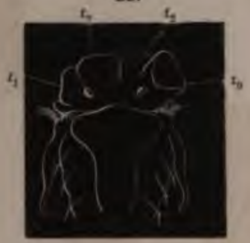

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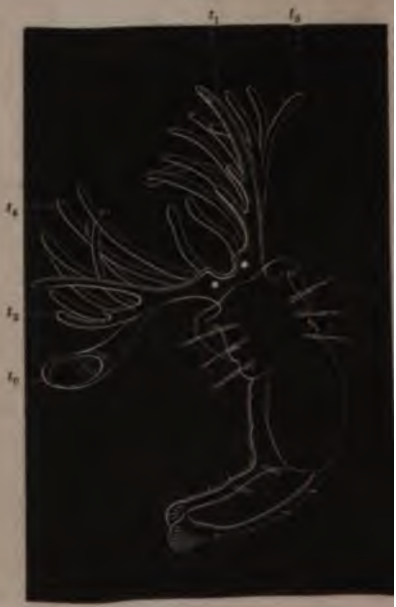

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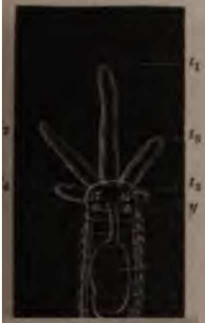

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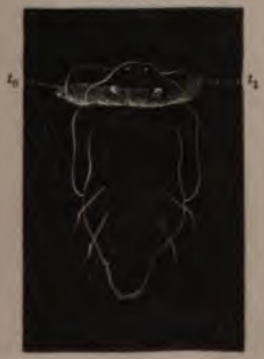

PL. VIII.

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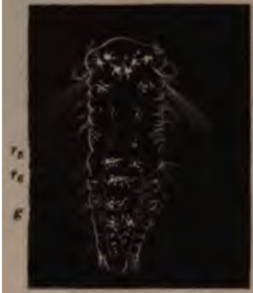

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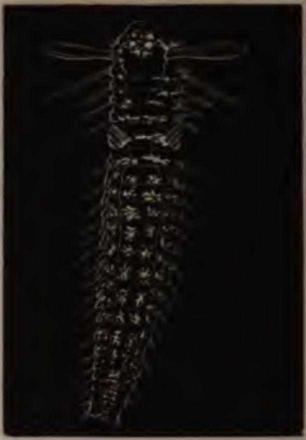

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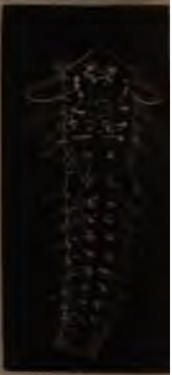

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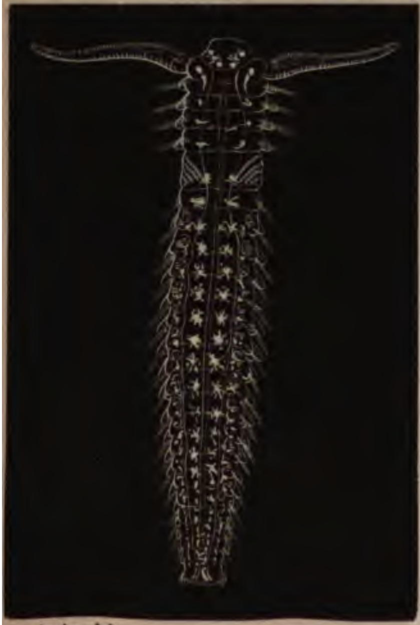

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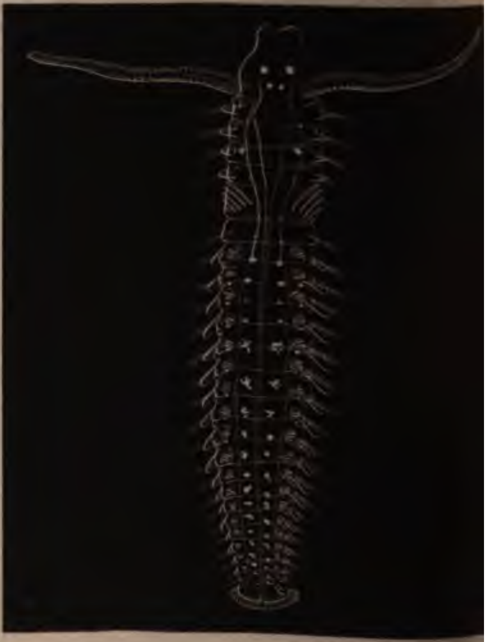

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PL. IX

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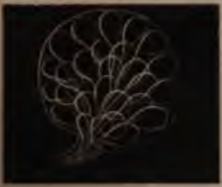

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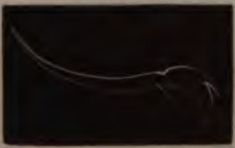

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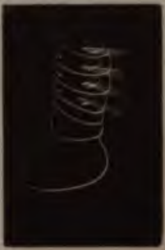

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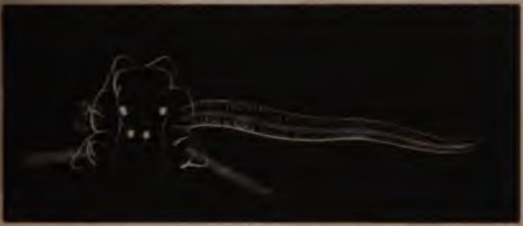

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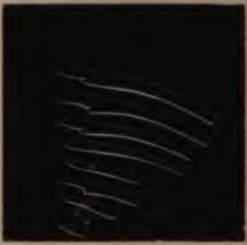

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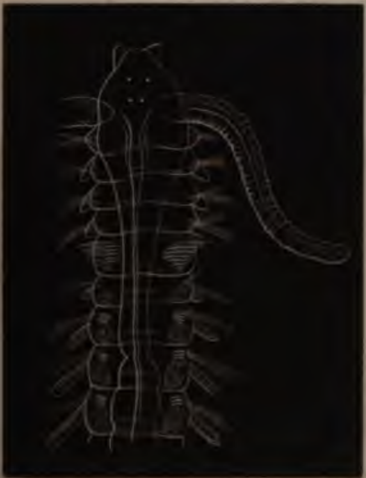

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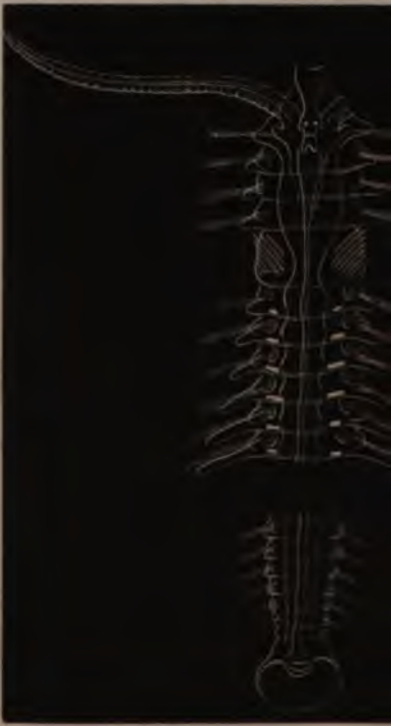

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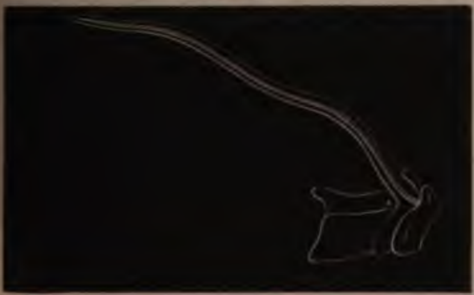

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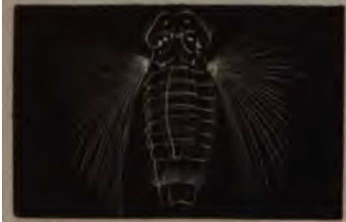

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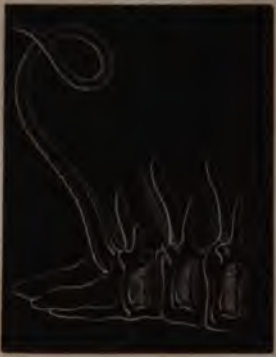

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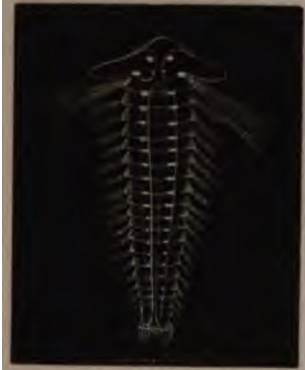

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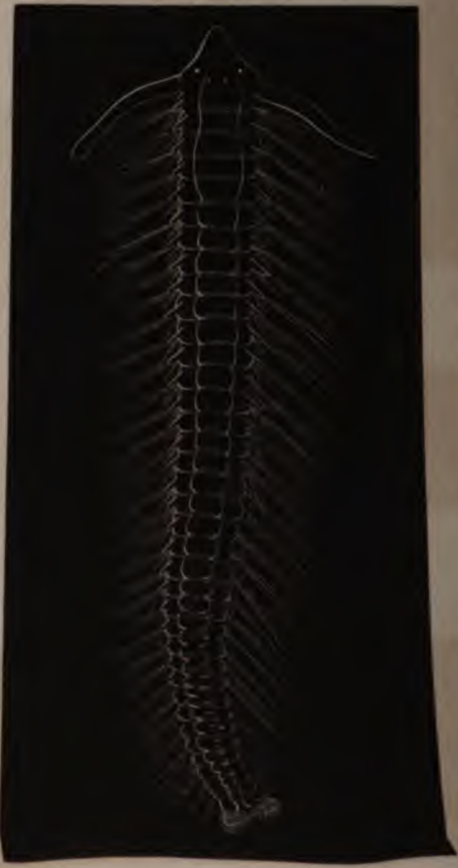

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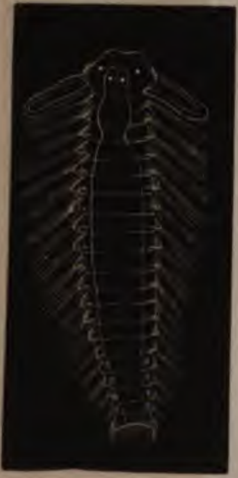

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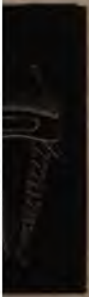
44.

45.

A. Ag. del.

PL. XI.

49



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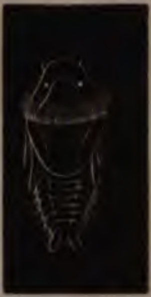

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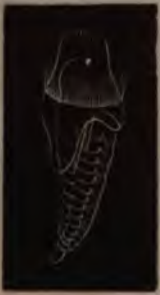

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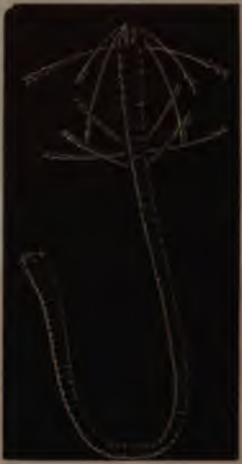

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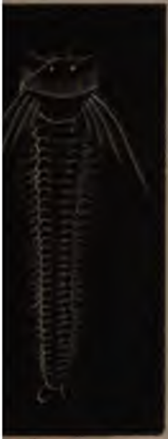

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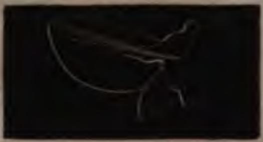

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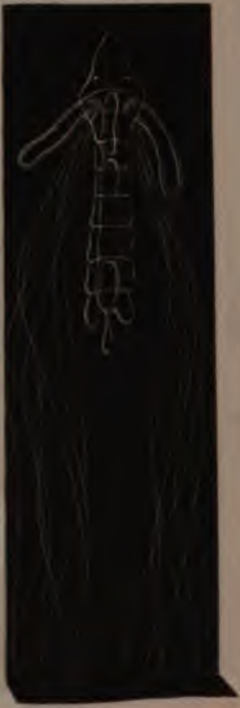

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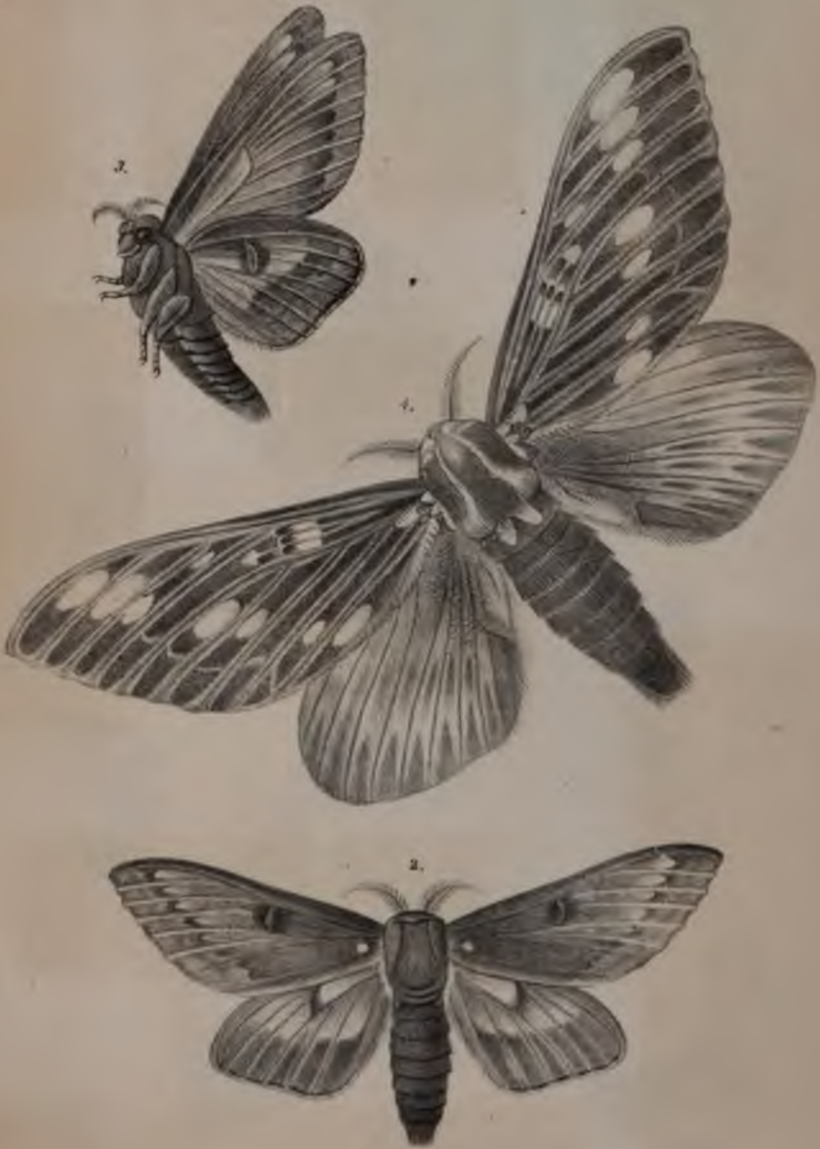
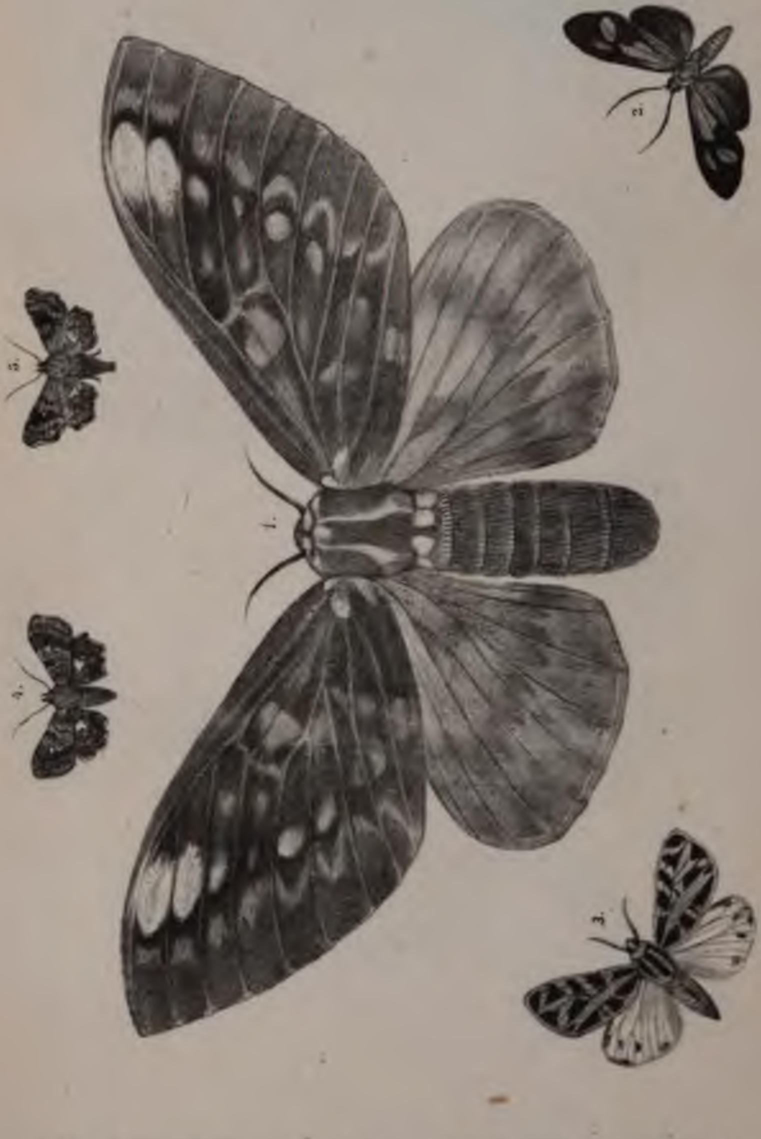
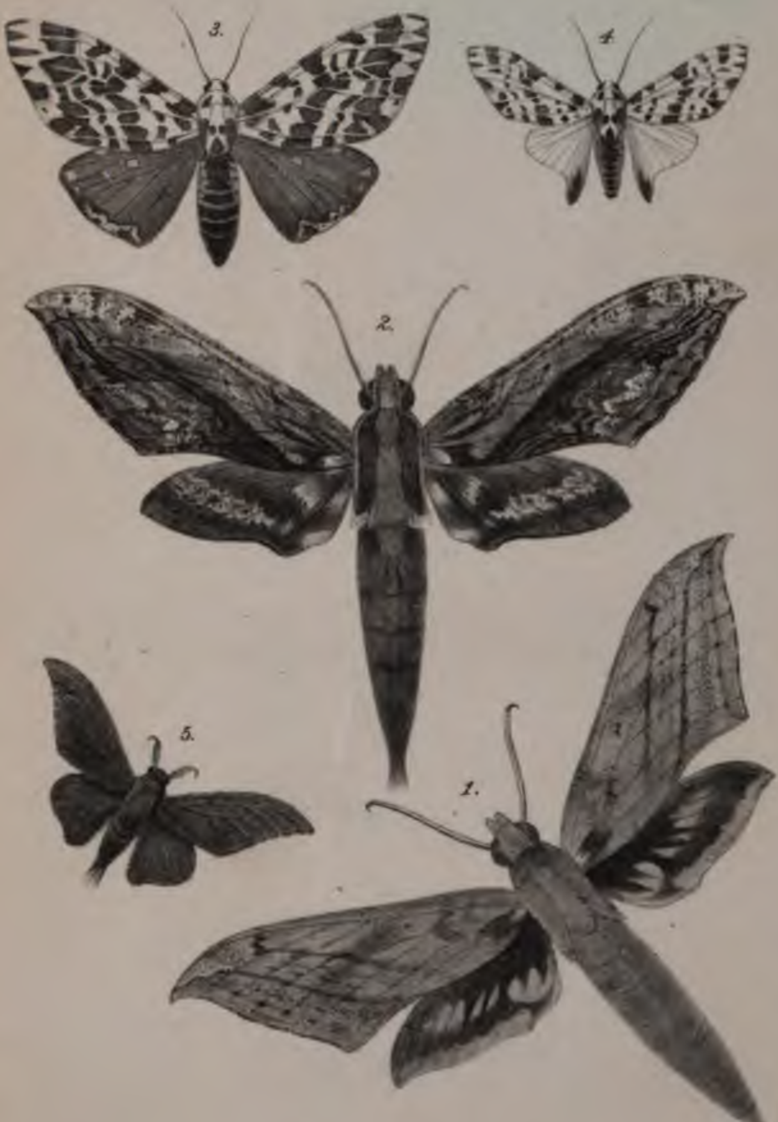


1. Citheronia regalis, *Hübner*, ♂.
2, 3. Citheronia sepulcralis, *Grote & Robinson*, ♂.

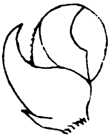
E. Wiest Photo.



1. Citheronia mexicana, *G. & R.*, ♀. 4. Platythyris fasciata, *G. & R.*, ♀.
2. Charidea bivulnera, *G. & R.*, ♂. 5. Platythyris fasciata, ♂, (reverse).
3. Arctia mexicana, *G. & R.* ♂.



1. Chœrocampa laevis, *G. & R.*, ♀. 3. Ecpantheria leucarctioides, *G. & R.* ♀.
2. Chœrocampa ceratomioides, *G. & R* ♀. 4. Ecpantheria leucarctioides, *G. & R.* ♂.
5. Psychocampa concolor, *G. & R.*, ♂.



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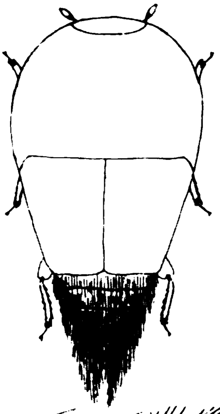

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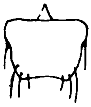

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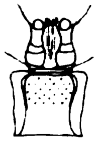

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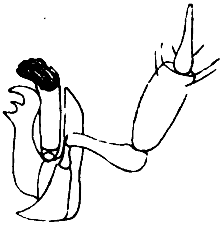

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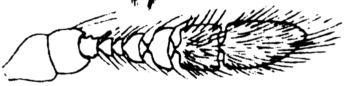

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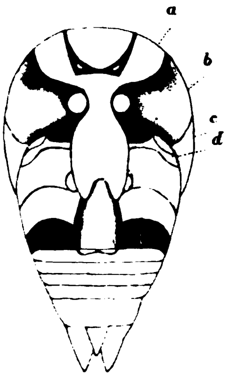

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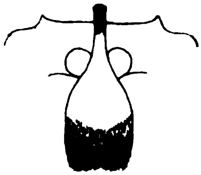

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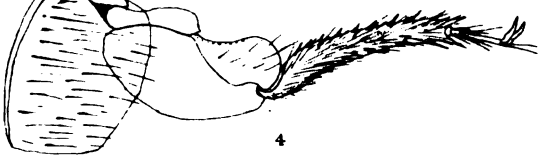

4

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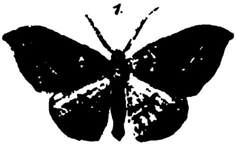
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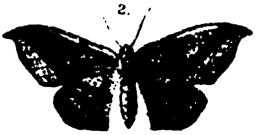
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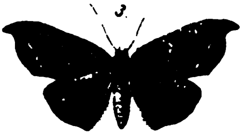
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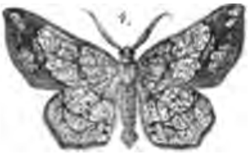
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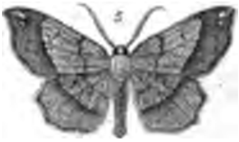
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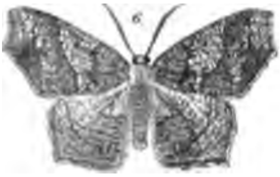
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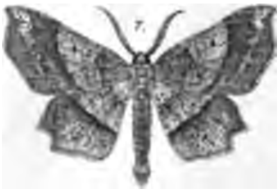
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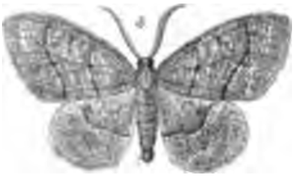
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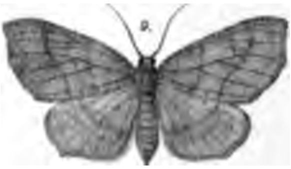
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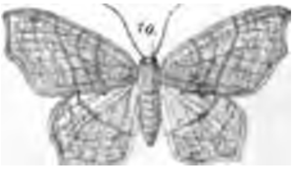
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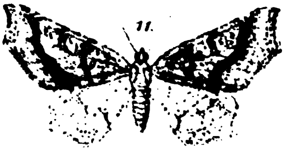
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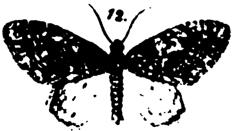
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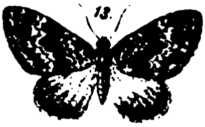
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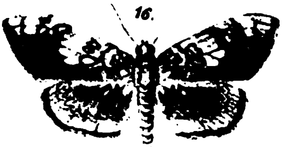
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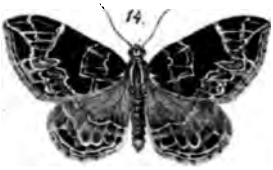
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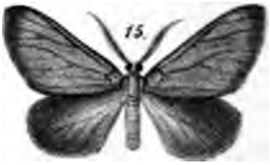
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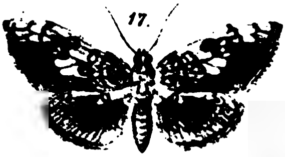
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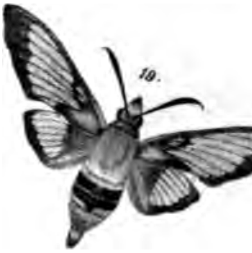
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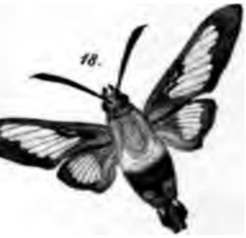
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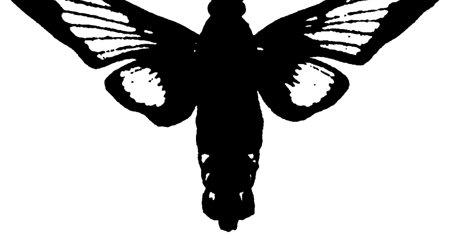
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